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Index to Advertisers—Page xlii.

Principal Contents:

	PAGE
Contractors and the McGowan Report	1
Peat Winning in Russia. By R. N. Tweedy	4
The Annual N.P.L. Visit	5
Charging Electric Vehicle Batteries. By A. Smart	6
Points from the McGowan Committee's Report	7
Institution Members at Rugby	9
Electricity at the Royal Show	10
Poultry Farming. By F. E. Rowland	11
The Generation of Peak Loads. By Vernon Walker	13
Municipal Transport	14
The E.C.A. at Folkestone	15
The Bradford Breakdown	16
Correspondence: Safety in the Home; Small Undertakings and the McGowan Report; Overhead Lines and Thunderstorms	16
New Apparatus and Devices	17
Business and Industrial Notes	21
Electricity Supply	25
Contract Information	28
Notes	29
Our Personal Column	30
Financial Section	31
Published Specifications	35
New Work for Contractors	36

Contractors and the McGowan Report

LAST week we promptly placed before our readers a brief outline of the recommendations reached by the McGowan Committee on Electricity Distribution. To-day we elaborate the principal points in such detail as is necessary to indicate more clearly how the proposals bear upon individual sections of the industry. That many of the statements will give rise to considerable discussion and difference of opinion is certain, as we have already stated.

As the first gathering to be held since the issue of the Report is the conference of the Electrical Contractors' Association, which takes place next week at Folkestone, it will be appropriate to see what the committee says regarding the best ways in which contractors can serve the common interest of electricity supply and of the public.

In any consideration of the future of the distribution side of electricity supply the electrical contractor is closely concerned. Leaders of the electrical installation industry, in the persons of Mr. W. H. Walton, the chairman of the Executive Committee of the E.C.A., and Mr. L. C. Penwill, director and secretary, presented the contractors' views to the Committee.

The future of the electrical contractor was apparently not considered a major matter by the Committee, for nothing is said about him in the "Summary of Conclusions and Recommendations," which were all we were able to deal with in our last issue, as the Report was received as we were going to press. Upon examination of the complete document, however, the contractor will find that he receives a pat on the head from the Committee. That august body of three says that it received testimony of the part played by the contractors in the general development of electricity supply.

Moreover, it is thought that generally the work of installing circuits and fixtures in consumers' premises can suitably be performed by recognised competent contractors acting in collaboration with the authorised distributors; in many districts this is done, with advantage to both parties and to the consumers.

Nevertheless, so far as the larger and more expensive appliances are concerned, the Committee thinks that the provision of apparatus is the supply authorities' affair. They should establish showrooms and service departments and institute hire-purchase schemes. It concludes with an expression of opinion that the competent or efficient contractor serves a useful and necessary purpose and should be taken into partnership, as it were, by supply undertakings in their joint service to the public.

While, no doubt, the contractor will modestly feel that the Committee's sentiments are quite as they should be, he will wish that something a little more positive had been said regarding his future. Since the famous Clause 48 of the 1926 Act was passed he has been endeavouring to establish his right to be considered an integral part of the electrical industry with a definite sphere of action. Experience has proved that, while some authorities are willing to co-operate with him, there is little certainty about his position. The alteration of the composition of a committee or board, or the advent of a new chief engineer or manager, may make a great deal of difference to him. And all the time there are a large number of undertakings which prefer to dispense with his services if they can. The attitude of the official representative bodies of the supply industry is, if anything, rather discouraging.

In these circumstances the contractor is not likely to be satisfied with the Committee's mere recognition of his worth, for he must feel that if he is already compelled to struggle to keep his position in the electrical industry, his plight under the proposed reorganisation may be even worse. The enlarged and more powerful supply authorities envisaged by the Report are likely to consider that an installation department run by themselves is preferable to the splitting up of their work among many outside contractors.

There seems to be a case for the closer regional organisation of the contractors themselves, so that a reconstituted supply authority, with powers over a wide area, would find a strong body of contractors in its area able to take over its installation work as a whole and allocate it among the members. The problem of the hire-purchase of the larger apparatus could more easily be tackled by such a body working in conjunction with the supply authority.

"Necessarily Gradual"

REMEMBERING how many false hopes were raised several years ago by politicians, orators and newspaper scribes regarding the cheap and abundant supply of electricity that was to be made available everywhere speedily under the Grid scheme, we hope that paragraph 483 of the McGowan Report (the last but two) will be made as widely known as possible. After making a full study of the entire case and expressing the belief that the improved organisation now suggested "will be reflected in more widespread supplies at lower and more uniform charges," this sentence, which we italicise for emphasis, appears:—

> *"We must point out, however, that the improvement must, under the best conditions, be necessarily gradual."*

Municipal Transport

WE wonder whether Alderman A. H. Gledhill was really surprised that the discussion on his paper at the Conference of the Municipal Tramways and Transport Association should have so little bearing on its ostensible theme of providing a basis for costing different services. It was none the less useful for provoking trolley-bus supporters to be thoroughly argumentative, because, in spite of the progress made during the last three years, the field is not yet won. Mr. C. Owen Silvers, the new president of the Association, who has done so much towards securing a place in the sun for the trolley-bus, is, first of all, a transport manager, and is quite alive to the economic case for the Diesel bus. He has expressed his views in *Bus & Coach* as to the possible effects of taxation on the position of the two rivals, and he has informed us that the price of electricity is likely to be the deciding factor. The enormous variation in charges made in different towns for electricity for tramways and trolley buses was shown up by Mr. C. Furness a few years ago in his Association paper, but the discrepancies remain. Will this come within the province of the "District Commissioners"?

Pylons Near Aerodromes

THE new clause inserted in the Air Navigation Bill, providing for the illumination of obstructions in the vicinity of aerodromes is not likely to affect overhead lines much. Actually, transmission towers and the conductors they support do not loom very largely among the hazards to airmen in relation to the total number of obstacles of all kinds. The implication of British Standard Specification No. 563—1934 is that only when exceptionally close to a landing ground will objects as low as the normal height of a transmission line require to be lighted. There is, of course, no suggestion in the Bill that underground cables should be substituted for overhead conductors. No limiting radius is mentioned, so that any structure regarded by the Secretary of State as dangerous to airmen under conditions of low visibility may be compulsorily lighted, but as the aerodrome proprietor has to pay the cost of the illumination, such requisitions are unlikely to be made regarding overhead lines without good reason.

The 40-hour Week

RECENT events in France have put the subject of shorter working hours into the limelight. But prior to this, in May last year, the matter had been raised in the electricity supply industry, when the Minister of Labour asked the employers' representatives on the industry's Whitley Councils to examine and report upon the effects of instituting a shorter working week. This report has now been presented and it is uncompromisingly against such a move. It is maintained that the introduction of a 40-hour week would raise the number of employés by 15.70 per cent. and the salaries and wages by 16.12 per cent., equivalent to 0.0258d. per kWh sold. A 42-hour week would involve increases of 12.22 per cent. in the number of employés and 12.75 per cent. in salaries and wages (0.0196d. per kWh). This information was gained from 36 of the largest undertakings in all parts of the country, and therefore probably errs, if anything, on the side of conservatism, *i.e.*, the increases would be even more in the case of smaller undertakings. The report stresses the impossibility of increasing the output per man among the generating staffs and considers that in the case of distribution staffs any "compensating advantage is highly problematical."

Lord Hirst's Review

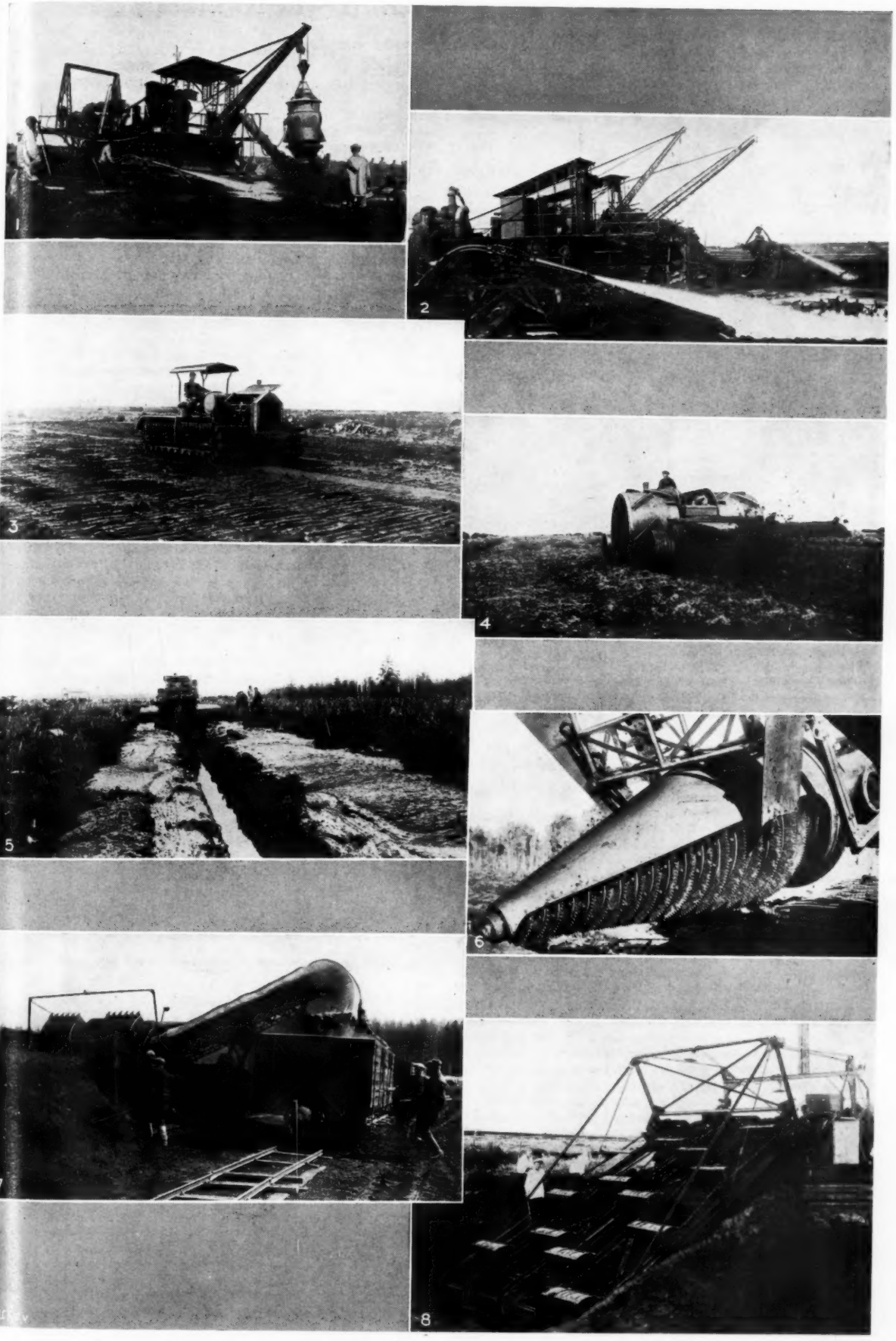
IN the course of his annual review of the excellent result of General Electric operations last year Lord Hirst spoke with pardonable satisfaction of the foresight with which in times of depression they had by continued research and development prepared themselves to take full advantage of the business recovery when it came. Given political stability within the next few years manufacturing and trading results will, he considers, continue to be as good as, or even better than, those reported this year. By increasing the number of its employés by 4,000 or 5,000 in twelve months the company has added substantially to the spending power of the people. The absorption of unemployed men in industry thus increases the national prosperity, especially if purchases are of British manufacture and industrial peace continues. Lord Hirst expressed the hope that a satisfactory settlement of present labour demands, having due regard to export trade needs, would preserve peace for many years to come. Though the company's main activities have concentrated on the Home market, its export trade expanded by 20 per cent. during the year and the greater prosperity of the British Empire is offering a better market than the rest of the world. The speaker holds that with the prevalence of world peace (which he believes we shall have for many years to come), industry and trade within the Empire will proceed from strength to strength.

Switchgear Segregation

THE official report on the breakdown at Bradford last February establishes that had the fire been confined to the switchgear section in which the fault occurred, the results would have been nothing like so serious, and also that the credit given everywhere to the staff with regard to the restoration of supplies was fully justified. We emphasise this, because the important point is not the failure of insulation cement but the prolonged interruption in supply. Bradford had bad luck; and presumably the new switchgear layout will prevent the possibility of a repetition, but that does not make it any less necessary to take stock of practice elsewhere as it affects the separation of duplicate switchgear.

Parkinson Scholarships

THE electrical industry will regard as particularly appropriate the very generous gift of £50,000 to Leeds University by Mr. Frank Parkinson, so well known as chief of Crompton Parkinson, Ltd. Himself the holder of a scholarship at the same University some thirty years ago, he has stated in a letter to the Vice-Chancellor that in placing the sum mentioned at the Council's disposal as a scholarship endowment fund he is anxious to help promising children of Yorkshire to secure the benefits of university education. By means of his gift he is doing something to ensure that the kind of assistance which was extended to himself as a student should be available to a larger number of Yorkshire students, and especially to those who otherwise, through insufficient means, might be unable to contemplate a university career or to engage in post-graduate research work. We congratulate the University upon having produced so successful a leader for electrical manufacturing and industrial organisation, and Mr. Parkinson upon his outstanding acknowledgment of the advantages received by him while little more than a youth—from 1903 to 1906—during his studentship in electrical engineering at the Yorkshire College and Leeds University.



Preparing and Collecting Peat in Russia. **(See next page)**

1. Work commencing with hydro plant. 2. Hydro-turf operations: jet equipment in foreground, crane with attendant timber grab and sludge pump. 3. Former-caterpillar for cutting up the turf in the drying grounds. 4. The fraizing system: surfacing the bog. 5. A "Tippermass" channelling machine. 6. A close-up view of a cutter. 7. Fraized turf being machine loaded into wagons from the stock pile. 8. An excavator employed with the "bagger" method

Peat Winning in Russia. By R. N. Tweedy

An important source of electric power for industry

WHILE we in the Irish Free State are fiddling about with Acts making the use of turf compulsory in domestic grates, and in preparing bogs for the production, in three years' time, of 150,000 tons of peat a year, the Soviet Government has been busy developing new methods and machines at such a rate that output has increased more than elevenfold since 1913. This fact is expressed in Table I.

TABLE I.
PRODUCTION OF AIR-DRIED TURF IN THOUSANDS OF METRIC TONS.

Method of Production.	1913.	1928.	1932.	1935.
Hand cut...	131.0	408.1	1,906.7	2,499.4
Elevation	1,557.0	3,946.4	4,745.9	7,628.0
Large hydro	—	957.2	2,713.3	4,499.9
Small hydro	—	—	320.3	618.0
Fraizer	—	8.2	3,760.1	3,034.0
Bagger	—	—	48.8	206.2
Totals	1,688.0	5,319.9	13,495.0	18,485.5

In the year 1935 regional electricity supply stations consumed nearly 6½ million tons of the total output. The output for the current year has been fixed at 20 million tons, of which about 13¼ million is to be obtained by the enterprises operating under the Central Turf Administration, the balance being got from smaller bogs on State and collective farms.

Peat is used already as the sole or main fuel in fourteen of the largest regional electric and thermal-electric power stations in the U.S.S.R. Last year more than 25 per cent. of all the power supplied by the power stations under the Central Power Administration was got from peat; and peat almost exclusively supplies power for the Moscow, Leningrad, Gorki, and Ivanovo provinces.

When I spent two days recently on the Gorki bogs I was told of large-scale experiments in the transmission of peat gas for distances up to twenty miles for use in industrial processes and power production, and I learn now (Monthly Review of the U.S.S.R. Trade Delegation in Great Britain for May, 1936), that peat is becoming rapidly the chief fuel for the gas generating stations of such large concerns as the Ural Machine Building Plant, the Ural Truck Building Plant, the First Ural Tube Plant, the Tikhvin Aluminium Combine, and a number of glass factories. The whole output of one of the Gorki bogs was being sent by rail last year to a glass factory some miles away. In 1935 the total production of gas from peat was 600 million cu. metres, and by-product plants are being put down for the better utilisation of this valuable native fuel.

During my visits to the bog areas of Leningrad and Moscow Provinces I received the greatest possible consideration from the Central Turf Administration (Director Schmidt), and I am indebted to the Administration for all the information in this article, which, incidentally, is exclusive to the ELECTRICAL REVIEW, and was tabulated at my request as particularly bearing upon the successful production and use of Irish turf for large-scale power and heat production.

It is frequently stated that climatic conditions in the U.S.S.R. bog areas are peculiarly favourable to the production of turf, owing to the hot summers and low humidity of the air, but atmospheric conditions during the much shorter turf harvesting season in the Moscow bog area are not so favourable as Irish critics would have us think; and the very high moisture content of the turf as used (Table II) should remove the last vestige of doubt that Irish turf is a fit substitute for coal under boilers.

TABLE II.
AVERAGE WATER CONTENT OF TURF AS DELIVERED TO THE BUNKERS (PER CENT.).

Method of Production.	1934.						1935.		
	Jan.	Feb.	Apr.	July.	Sept.	Oct.	Jan.	Feb.	Mar.
Elevator ...	44.5	46.5	50.0	49.2	31.4	38.2	38.1	38.9	36.5
Fraizer ...	48.4	55.5	50.4	47.9	42.7	47.7	47.5	49.2	48.0
Hydro ...	45.3	52.5	53.6	50.7	35.6	41.7	39.8	41.8	38.0

The Hydro Method

The elevator system is the oldest of the mechanical aids to turf getting, and requires a large proportion of hand labour. That fact, together with the difficulty of working either a hand-fed elevator, or an excavator-elevator (both combined with a macerator and sod-former) in the timber infested bogs so common in the U.S.S.R., led to the introduction of the hydro method which sluices the bog mass into a sump at the receding face, from whence it is pumped to drying ponds.

The illustrations show the method of working, which is discussed more fully in a paper which I read last year before the Engineering and Scientific Society of Ireland. Mr. Alan Monkhouse referred to this method in his I.E.E. paper (ELEC. REV., January 11th, 1935, page 45), and a great deal of information can be obtained from papers read by Russians at the 1928 World Power Conference.

Turf is won by the hydro system to a depth of about 15 ft., which is sufficient for most of the Russian bogs. Two pressure-pumping sets supply four hydraulic nozzles at each working face, two on each side of the slurry pump, the water being drawn from large drainage canals alongside. The seasonal output per hydro unit is about 50,000 tons at 97.2 per cent. water, and the season does not exceed ninety working days.

A small hydro-turf plant (single jet)

Roots and stumps are removed by grabs operated from caterpillar tractors on each side of the pumping unit. The slurry pump is driven by a 132-kW built-in motor, and the slurry is transmitted to an "accumulator" pond by another 184-kW centrifugal mounted on the central mobile platform. From the accumulator the slurry is driven by other pumps to the ultimate drying grounds, where excess water drains off rapidly, leaving a sludge-cake which can be cut into sods by one of several types of mechanical cutter after a period which depends altogether upon atmospheric conditions.

A smaller type of hydro machine was introduced recently, and is finding considerable favour on heavily timbered bogs which are not economically suitable for the larger unit. In this type the slurry-lifting pump is displaced by a ladder conveyor, but thereafter the two types are identical.

Vying in popularity with the hydro system is what is known in Russia as the fraizer or fraizing system, which scratches the surface of the bog to a depth of about ¾ in., the resulting dust and chopped-up fibres being turned mechanically several times before collection and transport to the field stock-piles. I saw this fraized turf being drawn into the Shatura power station in the proportion of about one-third to two-thirds of block or sod turf produced by elevator, "bagger" or hydro system. Probably it is used in a much higher proportion in specially designed furnaces. The "bagger" system is what we have known in Ireland, Germany, Canada and other countries as the mechanical excavator or dredger. One of the accompanying illustrations (page 3) shows one of the most recent Russian designs.

As the Soviet Government is faced continually by a shortage of labour for its enormous works of construction and production, it has been the chief aim of the Central Turf Administration to reduce the labour involved in turf production. Table III indicates to what a degree this end has been accomplished with each of the mechanical systems.

TABLE III.
PROGRESS IN MECHANISING TURF PRODUCTION SINCE 1913 (PER CENT.).

Method of Production.	Actual.		Possible.	
	1913.	1935.	1913.	1935.
Elevator	10	30.2	10	52.5
Large hydro	—	66.1	—	79.1
Small hydro	—	65.1	—	79.1
Fraizer	—	98.2	—	89.2
Bagger	—	65.0	—	87.4

Of the total output this year about 70 per cent. will have been obtained by machinery. Production, collection and drying will have been mechanised to the extent of 51.8 per cent., compared with 48 per cent. in 1935 and 44.4 per cent. in 1934. During this year increased production will take place in hydro-turf, and there will be a decrease in the relatively labour-burdened elevator system. Table IV shows the labour content per ton of air-dried turf produced from 1913 to 1935.

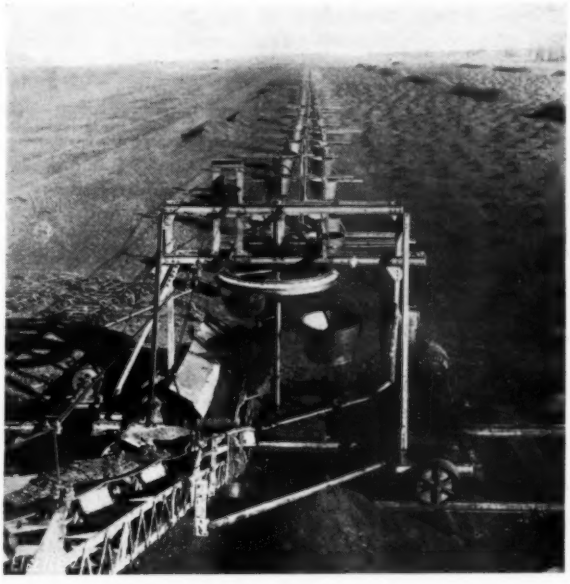
TABLE IV.
LABOUR CONTENT PER TON OF AIR-DRIED TURF (PER CENT.).

Method of Production.	1913.	1928.	1930.	1932.	1935.
Elevator	17.0	15.46	12.9	13.11	11.78
Large hydro	—	8.54	8.06	7.33	8.20
Small hydro	—	—	11.13	10.89	9.12
Fraizer	—	—	6.15	4.70	4.30
Bagger	—	—	—	11.57	11.22
Average	17.13	14.11	11.25	8.61	8.0

There is no doubt that the surge of *stakhanovism* which is sweeping over the U.S.S.R. to its utmost limits will produce results in the turf bogs similar in effect to those already seen in the coal mines, the oil wells, metallurgical plants, agriculture and light industry. Already observers have noted an increase in labour productivity up to 300 per cent. in the workshops and up to 340 per cent. in the bogs themselves. An actual increase of 19 per cent. in output with a reduction of 15 per cent. in labour staff is scheduled for the current year; and it is estimated that production costs will be down by 29.4 per cent.

The Central Administration for the Peat Industry has organised courses of training through which thousands of skilled workers are being passed on the bogs during this season. At Shaturdorf, the chief of the twenty-three workers' settlements in the Shatura bog area, I saw a "technicum" for boys and girls up to eighteen years of age, through which about 2,000 of the workers' children pass each year. The foundry, pattern-making shop, fitters' shop, machine shop, drawing office and science classrooms were well equipped, and the young students were delighted to show their work, including a large working model of an elevator machine, and a practicable rail-car, to a visitor to this isolated district, which, ten years ago, was entirely uninhabited, but now has a summer population of 30,000 people, and a permanent population of nine or ten thousand.

If the Irish Free State had begun to develop its magnificent turf resources in 1922, and had persisted with the same unconquerable courage as the Soviet Government has shown



A cable-way for conveying fraized turf from the drying grounds to the stock piles

under far worse conditions, there would be 40,000 persons now at work on the bogs, and many thousands more in the industries based upon this power centre.

The Annual N.P.L. Visit

THE yearly inspection of the National Physical Laboratory, Teddington, took place on Wednesday when several hundred guests were received by Sir William Bragg (chairman of the General Board), Lord Rayleigh (chairman of the Executive Committee) and Sir Frank Smith (director), in the million-volt test hall.

A 3,000-ft. overhead grid transmission line, provided by the Central Electricity Board, has been erected in the laboratory grounds together with equipment whereby the characteristics of an electrical discharge lasting only one millionth of a second can be completely analysed for studying the passages of surges along a transmission line at the rate of 186,000 miles per second for a period of one ten-millionth of a second.

The new photometry laboratory, which has been occupied only a few weeks, was on view for the first time. The building has been specially designed for photometric work, and includes a room 145 ft. long for the measurement of different types of projectors, such as motor-car headlights, signal lights, searchlights, etc. Space has also been provided to facilitate measurement of the light distribution or the illumination resulting from a lighting fitting suspended 25 ft. above ground level. The accommodation for the life-testing of electric lamps has been greatly increased. In the corridors are artificial "daylight" windows.

When human eyes are exposed to a glaring source of light the pupils contract to a diameter of the order of 3 mm. Subsequent recovery (rate of expansion of the pupil) is being studied by making kinematograph films of the eye with the aid of infra-red radiation.

Metallurgical Work

Differentiation between good and bad welded joints in steel structures, though not pronounced, has been found to be practicable in certain special cases by comparing the reluctance of the joint with that of a similar area of untreated metal. The material of the joint is considerably inferior, magnetically, to the parent metal, even when the joint is mechanically as strong as the remainder. X-ray diffraction studies have provided an important indication that changes of the crystal structure of metals that cause static fracture are of exactly the same type as those which lead to fatigue fracture.

An automatic potentiometer has been devised at the Laboratory for simplifying the making of thermal curves of metals and alloys. The change in resistance is made by a series of motor-driven dials, and the apparatus has been made self acting by causing the spot of light from a galvanometer, each time it crosses the zero, to actuate a photo-electric cell which controls the potentiometer. When combined with the Rosenhain plotting chronograph and with a gradient furnace in which the temperature of the specimen is progressively altered in a regular way, the taking of thermal curves becomes entirely automatic. The curves thus obtained are smoother than those which result from the ordinary working of the potentiometer and control by a tapping key.

The calibration of thermocouples at temperatures up to 1,063 deg. C. with high precision necessitates the maintenance of the furnace at a constant temperature for relatively long periods, and new apparatus for this purpose has been installed. For still higher temperatures, a thermostat controlling a furnace at temperatures up to 1,800 deg. C. is used for the calibration of optical pyrometers, and contains a radiator designed to give a very close approach to true black-body radiation.

Frequency Measurement

For the stroboscopic measurement of speed or frequency it is necessary to produce short intense flashes of light at the rate of some thousands per minute. This may be done by a tuning fork carrying suitable contacts, which cause trouble and are not very accurate. In new apparatus the contacts are replaced by a vapour-filled triode, the grid voltage of which is supplied by a valve-maintained tuning fork. The anode circuit of the triode is connected to a condenser, which is charged with d.c. At intervals controlled by the frequency of the grid supply this condenser is discharged through the primary winding of an induction coil: special neon tubes connected across the secondary of this coil give the desired short flashes of light. The power taken from the standard frequency circuit is approximately 0.5 W, while the rate of energy input to the neon tubes during the flash is some hundreds of watts. The effective duration of each flash is of the order of 0.00005 second. The frequency of the flashes is at all times within two parts in ten thousand of the nominal value for the apparatus.

An apparatus for detecting the presence of destructive insects in timber was demonstrated. The specimen of timber to be examined is placed in the inner box of the sound-proof chest. A sensitive microphone (of piezo-electric type, embodying crystals of Rochelle salt) is placed in contact with it. The faint sounds picked up are magnified by a special amplifier, in which the first valve is of a special non-microphonic type, used in order to minimise the background noise inseparable from very high amplification. The apparatus was designed by the N.P.L. for use by the Forest Products Research Laboratory.

Charging Electric Vehicle Batteries.

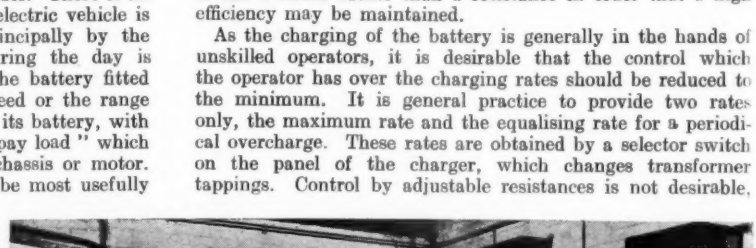
By A. Smart, B.Sc.(Eng.)

The best methods to adopt

THE battery operated electric vehicle, after periods of popularity and temporary eclipse by the petrol vehicle, must once more be considered as an important mode of transport. The conditions which have occasioned this return to favour are the considerable reductions which have been made in the prices of these vehicles and improvement both in performance and in the charging facilities available. There is no doubt that, for certain classes of work, the electric vehicle is unrivalled. Its limitations are imposed principally by the battery: the energy which is available during the day is dependent on the voltage and capacity of the battery fitted to the vehicle. An increase in either the speed or the range of a vehicle means an increase in the size of its battery, with a corresponding decrease in the maximum " pay load " which can be carried with any particular size of chassis or motor.

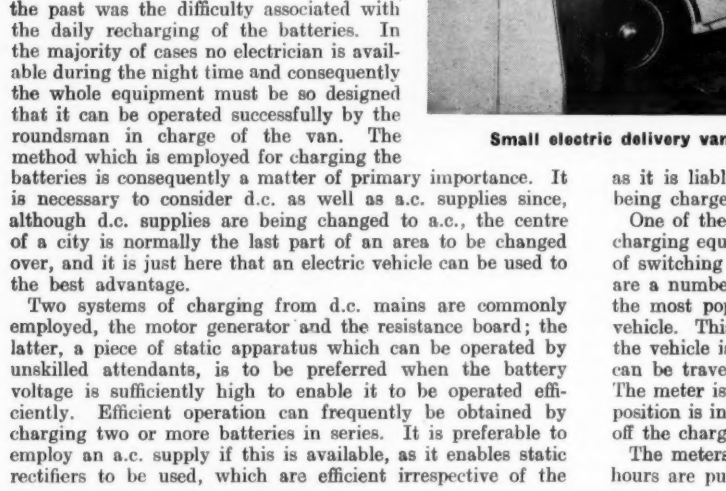
For these reasons this type of vehicle can be most usefully employed where the distance travelled each day is relatively short and a high speed is not required. The maximum speed is generally about 20 m.p.h. with a range of 40 to 60 miles. There are certain classes of transport work, particularly the local delivery of bread, milk and similar commodities, for which this specification completely satisfies the requirements, and under these circumstances an electric vehicle is much cheaper to operate than a petrol vehicle.

One of the principal factors that militated against the wider use of electric vehicles in the past was the difficulty associated with the daily recharging of the batteries. In the majority of cases no electrician is available during the night time and consequently the whole equipment must be so designed that it can be operated successfully by the roundsman in charge of the van. The method which is employed for charging the batteries is consequently a matter of primary importance. It is necessary to consider d.c. as well as a.c. supplies since, although d.c. supplies are being changed to a.c., the centre of a city is normally the last part of an area to be changed over, and it is just here that an electric vehicle can be used to the best advantage.



Small electric delivery vans receiving their charge during the night

Two systems of charging from d.c. mains are commonly employed, the motor generator and the resistance board; the latter, a piece of static apparatus which can be operated by unskilled attendants, is to be preferred when the battery voltage is sufficiently high to enable it to be operated efficiently. Efficient operation can frequently be obtained by charging two or more batteries in series. It is preferable to employ an a.c. supply if this is available, as it enables static rectifiers to be used, which are efficient irrespective of the battery voltage. Either a valve or a metal rectifier may be used; the latter lasts much longer and requires no attention.



Metal rectifiers used for automatically charging the batteries of a fleet of medium-sized electric vehicles

In order that charging equipment may be successfully used by an unskilled operator it is necessary that it shall be fully automatic. The time available for charging the battery is generally limited and consequently it is usually charged at the maximum rate. This rate is limited by the temperature rise of the battery and the gassing at the end of the charge. The current at the end of the charge is approximately half the starting rate. The tapering charge is obtained by controlling the circuit impedance, the maximum taper being produced with the minimum impedance. It is necessary to compromise in design, as small variations in supply voltage produce dangerously large fluctuations in the charging current if the impedance is reduced to too low a figure. It is preferable to use a choke rather than a resistance in order that a high efficiency may be maintained.

As the charging of the battery is generally in the hands of unskilled operators, it is desirable that the control which the operator has over the charging rates should be reduced to the minimum. It is general practice to provide two rates only, the maximum rate and the equalising rate for a periodical overcharge. These rates are obtained by a selector switch on the panel of the charger, which changes transformer tappings. Control by adjustable resistances is not desirable, as it is liable to misuse and generally results in the battery being charged at too high a rate at the end of the charge.

One of the principal problems associated with the design of charging equipment is that of obtaining a satisfactory method of switching the charger off at the end of the charge. There are a number of methods which may be employed, of which the most popular is the ampere-hour meter mounted on the vehicle. This meter records the discharge of the battery when the vehicle is in use and shows the driver the distance which can be travelled before the battery is completely discharged. The meter is fitted with contacts which operate when the full position is indicated and which can be employed for switching off the charger.

The meters are so designed that 20 per cent. more ampère-hours are put in during charge than are taken out during discharge. The principal criticism of this system lies in the fact that the meter does not record the actual condition of the battery, but only gives an indication of what it should be. With a view to overcoming this difficulty, several alternative schemes have been proposed. The majority rely for their operation on the voltage characteristics of the battery during charge. It will be remembered that the voltage of a lead-acid battery rises rapidly at the commencement of the charge to about 2.1 V per cell and continues at about this voltage until approximately 80 per cent. fully charged. The voltage then rises to about 2.7 V per cell in a very short period and continues without any great change until the charge is terminated. The sudden rise in voltage corresponds to approximately 80 per cent. of the full charge and as the last 20 per cent. has to be put into the battery at maximum voltage, a voltage relay alone is not sufficient. Neither is it sufficient to arrange the characteristic of the charger in such a way that when the rapid rise in voltage takes place the charging rate will fall to such a figure that it may be left on for a lengthy period without damage to the battery (as this rate is so low that the time taken in putting into the battery the last 20 per cent. of its charge is frequently prohibitively long).

The most satisfactory control system which has yet been proposed consists of a voltage relay working in conjunction with a time switch. The relay is arranged to operate during the period when the battery voltage rises rapidly; as this time is relatively short, small errors in the operation of this

Points from the McGowan Committee's Report

Plans for reorganising electricity distribution

It was impossible in our last issue to do more than reproduce the principal conclusions and recommendations of the McGowan Committee on Electricity Distribution. In the body of the report there are many interesting points which justify further reference, and the principal ones are dealt with below.

Past Legislation.—To enable existing conditions to be comprehended the Committee surveys the enactments relating to electricity supply from 1882 up to date, and comments upon the results. In particular it shows how the growth of the power companies formed as a result of the recommendations of the Cross Committee was retarded by the failure of distributing authorities to take bulk supplies from them which led to a multiplicity of small generating stations. The attempt made in the Acts of 1908 and 1909 to co-ordinate neighbouring undertakings by means of joint boards was not successful. The Electric Supply Committee recommended the formation of a central authority to control generation and distribution. The result was the 1919 Act which established the Electricity Commission, but was shorn of its compulsory nature. In 1926 generation and main transmission were placed under the control of the Central Electricity Board. The Weir Committee, which was responsible for this Act, recommended that powers of supply should be given over wide areas to a new type of company embodying the more desirable features of both power and distribution companies to be purchased at the end of fifty years by a Joint Electricity Authority or association of local authorities. Some twenty undertakings of this kind have been established under Section 39 of the 1936 Act.

The Present Position.—The Committee finds that there are now no fewer than 635 separate authorised undertakers, of whom 627 were actually supplying electricity at March 31st, 1934. These have a variety of systems and voltages and outputs ranging from a few thousand kWh per annum to upwards of 500 million kWh. Instances of duplication are given such as where power companies, precluded from distributing by their Acts, have obtained Provisional or Special Orders which they exercise themselves or through subsidiaries. While the power company holds its power rights in perpetuity these distributing undertakings are eventually purchasable by the local authorities in the areas and may in the future be subdivided into a number of small and relatively uneconomic units. Again, in some areas a power company is supplying all the important power consumers in a particular area while the local authority is supplying the lighting and domestic consumers. Both parties thereby lose the benefits of load diversity and have their costs increased. There are now twenty-seven power companies representing an important proportion of the whole supply system.

Basis of Reorganisation.—All witnesses agreed that the present organisation calls for improvement. This, the Committee considers, involves either (1) The immediate setting up of regional boards to buy out existing undertakings, or (2) the absorption of the smaller and less efficient undertakings by the others. The first alternative would involve serious dislocation of the supply industry, while the assessment of compensation would lead to uncertainty. Any revolutionary course would be justified only if the constituent bodies (apart from the industry as a whole) were inefficient and incapable of evolutionary improvement.

That is not regarded as being the case, since sales of electricity have shown continued and increasing advances year by year, although progress varies greatly among individual undertakings. The advantages of large undertakings from the technical aspect is that high-voltage systems can be laid out for more reliable and economical operation, and low-voltage distribution is more flexible than where boundary questions are involved. Such undertakings can usually secure higher diversity between the times of maximum demands of varied classes of consumers. Moreover, they are often better to secure loads owing to their lower distribution costs or to take risks involved in incurring heavy capital expenditure on mains or on hiring facilities and assisted-wiring schemes. Large undertakings are able to obtain more favourable trade discounts when purchasing apparatus, whereas almost every small authority is said to require special modifications to apparatus or cables thereby increasing manufacturing costs. The payment of salaries high enough to attract and retain men of the best qualifications, including experts to deal with individual classes of supply, are often beyond the means of the smaller undertakings in which all the duties have to be concentrated in the senior executive officer. In certain cases small undertakings, owing to favourable local conditions, charge lower prices than do larger undertakings, but the object in view is to spread lower costs over wider areas.

District Commissioners and Advisory Committees.—It is, therefore, recommended that as soon as an Act embodying the recommendations has been passed, the Electricity Commissioners should delimit the country into areas suitable for schemes of amalgamation or co-ordination of undertakings. They would then appoint "District Commissioners" with financial and technical staffs (to be completely independent of the Electricity Commissioners) who would prepare schemes of reorganisation in collaboration with, and if possible by agreement with, the undertakings as represented by an unpaid Advisory Committee in each area. All undertakings irrespective of size would be reviewed. The Electricity Commissioners would approve such schemes, with or without modification, after hearing informally any representations made by undertakings. After approval a scheme would become operative if agreed to by all the authorities concerned or if the outputs of the compulsorily acquired undertakings were less than ten million kWh in the year ended March 31st, 1936. In 1933-34 there were upwards of 400 of this size, but their aggregate sales represented less than 10 per cent. of the total for the whole country. An undertaking above that capacity would not be compulsorily acquired or amalgamated without Parliamentary approval. Where reorganisation on these lines is impracticable, undertakings might be amalgamated to form a public authority on the lines of the Central Electricity Board. It is not thought desirable to set up further electrical bodies, and it is suggested that the position of Joint Electricity Authorities might be reviewed by the District Commissioners.

Power Companies.—It is suggested that, where appropriate, the basis of consolidation of a power company's undertaking should be on the following lines: (*a*) The amalgamation of its distribution undertakings with the non-purchasable undertaking; (*b*) the suspension of local authorities' purchase rights for an equated period; and (*c*) the transfer of smaller undertakings (local authority and company) in or adjacent to the company's area. At the end of a certain period (not exceeding fifty years) the whole of the undertaking should be purchased by some form of public authority on the basis of capital expenditure less depreciation. During their tenure the power companies should be subject to financial control; the application of a sliding scale relating prices to profits; the approval of terms of issue of new capital; and more effective control by the Minister of Transport of methods of charge for domestic and similar supplies. In the case of schemes dealing with power companies Special Order procedure should be followed, *i.e.*, approval by the Electricity Commissioners, confirmation by the Ministry of Transport, and final approval by Parliament. Where undertakings in a power company's area are too large to be transferred, or no general advantage would accrue from transfer, the power company should be required to sell, and the undertakings in question should be entitled to buy, so much of the power company's undertaking as is within their districts, with suitable compensation for losses.

Purchase Rights and Tariffs.—An important factor in securing improvement will be the adoption of uniform methods of charge throughout a consolidated area and ultimately of complete uniformity of charges. If the charges of an acquired

Charging Electric Vehicle Batteries (*Concluded from preceding page*)

relay are of no consequence. The relay operates a time switch which allows the charger to continue charging for a predetermined period. This type of control is, however, more costly than the ampere-hour meter, which is used quite successfully under the majority of conditions.

It will be apparent that the principal factor limiting the application of electric vehicles at present is the maximum amount of energy which can be stored in the battery. The advantages of this type of vehicle are such that it is to be hoped that its scope may in future be extended. Such an extension will result either from the development of a battery with a much higher capacity for the same size and weight (this appears at present unlikely) or from the use of interchangeable batteries.

Already one firm of manufacturers has so designed the chassis of its vehicle that the batteries may be replaced in a very short period. A small passenger vehicle has also appeared on the market recently, an interesting development which may quite possibly lead to the use of electric motor cars for town use on a large scale. With the low running costs, silence, rapid acceleration and ease of control the electric vehicle has much to recommend it for this purpose, especially if the system of interchangeable batteries is adopted.

In conclusion it should be stressed that an electric vehicle consumes home produced fuel and provides a valuable night load for electricity supply authorities.

undertaking are lower than those of the authority in which it is merged, provision would be made to prevent hardship to two-part tariff consumers. Terms of acquisition of companies would include compensation for loss of future profits, and of local authorities cost less depreciation of physical assets.

Extension of Electricity Commissioners' Powers.—One of the main results anticipated for reorganisation is that the remaining undertakings would secure an undisturbed franchise for a substantial period which would encourage an enterprising policy of development. The Electricity Commissioners, therefore, would have no power to insist upon further amalgamations, but they could require extensions in undeveloped areas on an economic basis and the offering of hiring facilities. With a view to securing a greater measure of consultation between undertakings, the advisory committees would become a permanent feature, meeting at regular intervals to discuss means for promoting expansion of demand and improved hire schemes or new tariffs to meet special cases. The reduction in the present multiplicity of distributing bodies would facilitate the preparation of statistical returns, which might be published quarterly with the idea of fostering a competitive spirit. Fringe Orders are to be retained, but may be made permanent by the Electricity Commissioners, who would also make other boundary adjustments.

The London District.—Special consideration is given to the London district in view of the existence of the London and Home Counties Joint Electricity Authority. This Authority's constitution and powers are reviewed, and the Committee concludes that a substantially greater measure of amalgamation and co-ordination is necessary and that there is no reason why its recommendations for reorganisation in other parts of the country should not apply to this area too. It would be for the District Commissioner to consider whether the J.E.A. should be retained in its present form or with a modified constitution. It is not suggested that the London Electricity Acts of 1925 should be varied except to bring settlements under the Acts into line with any amalgamation of the companies concerned as a result of a District Commissioner's scheme.

Holding Companies.—Three types of holding company exist. (1) One which is itself an authorised undertaker which controls through shareholdings other authorised company undertakings; (2) one which is not an authorised undertaking but controls through shareholdings authorised company undertakings and acts as manager and/or contractor for these; and (3) one which is not an authorised undertaker but controls authorised company undertakings mainly as an investment. The holding company system has achieved to a considerable extent certain of the advantages which the Committee envisages as a result of the amalgamation of the smaller undertakings, although the full advantages have not been obtained owing to the undertakings being in widely separated areas. There are, however, potentialities of abuse in the system, among which are the possibility of investments being obtained at too great a cost; the payment of excessive remuneration for services performed by the holding company for subsidiaries; the diversion of profits on installation work from the subsidiary to the holding company; and the charging of excessive interest upon advances by the holding company to subsidiaries. The Committee states that it is believed that the system obscures the real amounts paid in dividends and by way of bonus shares. It is therefore recommended that the holding companies and their subsidiaries should be amalgamated when this appears to be desirable; otherwise the accounts of holding companies should be subject to official audit.

Standardisation of Systems.—Complete standardisation of systems at 400/230 V a.c. would involve 360 undertakings (1933-34 figures) which supply at forty-three declared voltages between 100 and 480 V (20 per cent. of the total kWh is sold on the d.c. system). Of these undertakings, 103 supply a.c. and 134 supply d.c. at voltages so near the standard that, having regard to the variation permitted, uniformity should be easy to achieve. The Electricity Commissioners already have power to compel the alteration of system if this would not entail unreasonable expense. The chief deterrent is the expenditure involved in altering apparatus on consumers' premises (especially radio receivers) which has to be borne by the undertaking. Estimates made in 1930 gave the cost of standardising voltages below 220 at from £10 million to £16 million, and above 240 at about ten per cent. of these amounts. Having regard to the annual levy now made to cover frequency change-overs, the Committee considers it undesirable to impose a further tax for immediate and compulsory standardisation of voltage, but the tendency to do so voluntarily will be expedited by the reorganisation recommended.

Charging Methods.—The numerous variations in the methods of charge in different areas is thought to justify public criticism. Wide differences of opinion exist as to the best method of charge, but all progressive undertakings recognise that any substantial expansion of demand, particularly for domestic and shop and office supplies, can be secured only through the offer of a two-part tariff. There is at present no legislative provision which *requires* a distributor to offer a two-part tariff as an alternative to a flat rate, and the Minister of Transport should be empowered to rectify this. None of the existing methods of assessing the fixed charge for residences is regarded as satisfactory enough to be imposed compulsorily, but a substantial step towards uniformity would be taken if the basis were required to be either the size of house (floor area) or rateable value. For shops and offices it is noted that a fixed charge based on lighting voltage installed has been widely adopted. Conferences between the Federation of British Industries and the supply associations have resulted in a considerable measure of agreement as to what can be regarded as appropriate bases of tariffs for various classes of power supply. In view of the increasing number of purposes for which electricity can be used, considerable flexibility should be permitted in quoting special rates, as restrictions in this way are detrimental to development. Differences between lighting flat rates in various areas is one of the principal grounds of complaint among consumers, but the importance of these can be over-emphasised. In certain areas the lighting rates appear to be too low to be economic, and, moreover, militate against the widespread adoption of the two-part tariff. Consumers sometimes question the fairness of the fixed-charge assessment as applied in individual cases, and the Committee holds that the scale on which these are based should always be published. A secondary charge of 0.5d. per kWh is thought to be sufficiently advantageous to encourage the use of electricity for practically all domestic purposes. At the end of 1934 one-fifth of the total mileage of streets in urban areas were without distributing mains. More than 150 undertakings, some large, had no showrooms, while 20 per cent. of the total had no scheme of assisted wiring; this is regarded as essential to the connection of smaller dwellings in any considerable number. The policy of such undertakings is reflected in their low load factor and small output.

Supplies in Rural Areas.—Out of the total area of Great Britain, over 86 per cent., containing all but one per cent. of the population, is covered by supply powers, but this does not mean that electricity is available everywhere. Great importance is attached to the grouping of rural areas with urban areas, as the organisation of the latter can be extended at low cost to deal with rural developments for which arrangements for the hire-purchase of electrical machinery by farmers are desirable. For domestic premises the floor-area two-part tariff has been found suitable. While it is the duty of the undertaking to create a demand to justify the cost of providing supplies, local authorities can facilitate extensions by using electricity for pumping and street lighting and guaranteeing revenue backed by the local rates. The Minister of Transport when granting compulsory wayleaves should be empowered to fix rentals also. Reference is made to the meagre financial support, in relation to the gross revenue of the industry, that is given to E.D.A. Its activities are commended, as are those of the E.A.W., while the goodwill value of an adequate staff for giving prompt attention to small repairs and complaints from consumers is fully appreciated by the Committee.

Possible Reductions in Costs.—Although the cost of generation has fallen by 46 per cent. during the last ten years, the cost of distribution per kWh sold has remained practically constant, and a reduction must be looked for in the greater sale of electricity in relation to capital invested.

Combined Gas and Electricity Undertakings.—The existence of gas and electricity undertakings under joint control is considered to be inimical to electrical progress. Evidence showed that restrictions take the form of discouraging extension of mains in streets already provided with a gas supply; reluctance to introduce attractive tariffs which would expand the output of the electricity undertaking; or the non-provision of electricity in housing schemes where gas is already installed. The Committee recommends that legislation should provide that local authorities should not be entitled to restrict the right of any owner or occupier of premises to take a supply of electricity.

Electrical Contractors.—The Committee received testimony of the part played by electrical contractors in the general development of electricity supply; that they have been and are useful agents in acquiring new business. The Committee thinks that generally the work of installing circuits and fixtures in consumers' premises can be suitably performed by recognised competent contractors acting in collaboration with the authorised distributors, as is already done in many districts with advantage to both parties and to the consumers. It is necessary, however, for the supply authority to establish and maintain showrooms and a service department, and to assist consumers with hire-purchase installations and apparatus, especially of the more expensive kinds.

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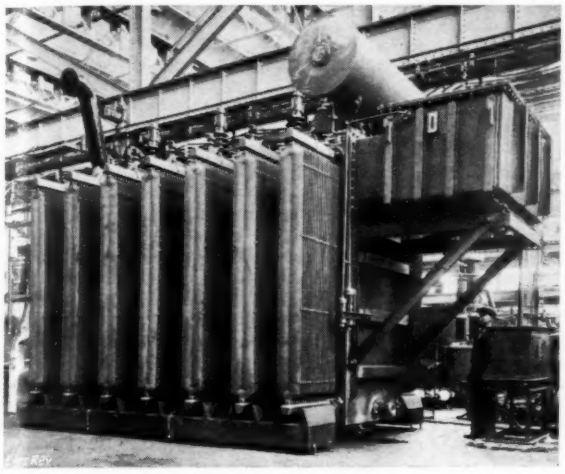
Institution Members at Rugby

MEMBERS of the South Midland Centre of the Institution of Electrical Engineers who visited the Rugby works of the British Thomson-Houston Co. on Tuesday last were fortunate in finding a number of very varied



A 20,000-kVA, 66/22-kV air-jet-cooled transformer with on-load tap-changing gear

examples of engineering, from heavy-power to light-current, going through the shops. Conspicuous among the former were the 75,000-kW turbo-alternator for Barking B power station (County of London Co.), a 51,000-kW set for Kearsley (Lancs E. P. Co.), and a 30,750-kW set for Longford (Coventry); the last two will generate at 33 kV. There were also 30,000-kW turbo-alternators for Kirkstall (Leeds), Neepsend (Sheffield), and Portsmouth, as well as several of small outputs. A horizontal turbine-casing boring machine for taking work up to 18 ft. wide by 20 ft. long and machining up to a diameter of 18 ft., and a planer for work up to 13½ ft. wide by 12 ft. high with a 25-ft. stroke, attracted the attention of the 160 visitors.

In the largest electrical machine shop were a 4,500-h.p. synchronous-induction motor (said to be the largest of its kind) for driving a continuous billet mill, two 2,000-h.p. slip-ring motors, four 500-h.p. d.c. motors, three 2,500-kW motor generators (with single commutators) delivering 10,000 A at 250 V for electrolytic work, and a 1,000-h.p. d.c. tyre mill motor, to mention only a few of the largest machines under construction. A number of variable-speed a.c. commutator motors up to 150 h.p. were among the most notable features of the motor factory, where "No-lag" power-factor correction motors are also made.

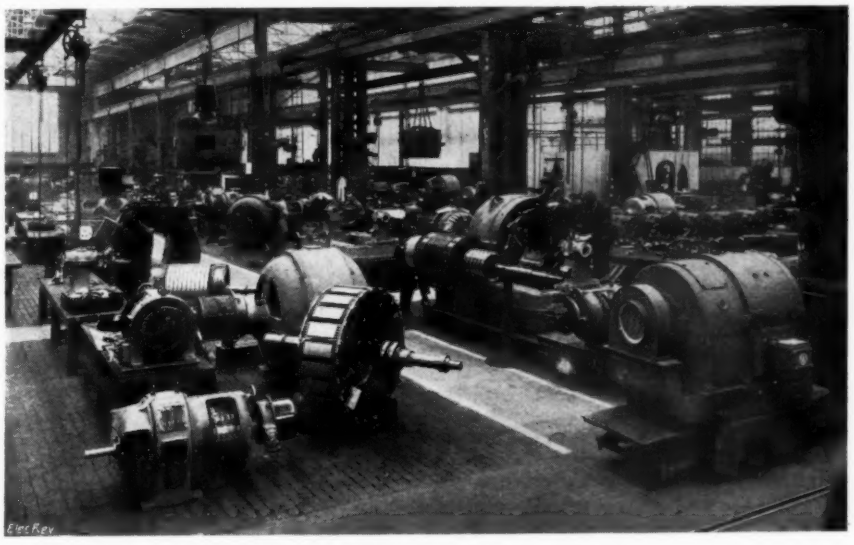
The transformer department contained units ranging from 30,000 kVA at 132 kV down to 132-kV potential transformers, both extremes being destined for the grid. In between came nearly three dozen 500-kVA transformers for one order.

A recurrent-surge oscillograph has been developed for measuring surge-voltage distribution, as it has been found unnecessary to use such complex apparatus as formerly for impulse testing, provided recurring surges are applied to an oscillograph so that each successive surge causes the cathode ray to trace the same path. In this way a persistent image of the surge voltage can be obtained on the screen of a high-vacuum glass-tube cathode-ray oscillograph. Thus, a 3-kV tube of the type developed for high definition television reception gives adequate illumination on the fluorescent screen for impulse voltages of 50 micro-seconds' duration recurring 50 times per second. Some of the thirty-five 1,500-kW 3-kV rectifiers ordered for the South African Railways were visible in various stages of construction, as well as five 400-kW units also with control grids for operating at 12/22 kV.

Every kind of automatic and non-automatic control gear, from that for fractional h.p. motors to that for machines of over 20,000 h.p., seems to be made in the three-storey department set apart for the purpose. The range includes equipments for building into machine tools. There are also being made tap-changing gear (on- and off-load) for power transformers, "Tungar" rectifiers, sound-amplifying equipments, "Mercra" lanterns, thyratron timers for welding machines and hot-cathode rectifiers.

Another three-storey building is allocated to the manufacture of domestic appliances, such as refrigerators, washing machines, cookers and immersion heaters. Of at least equal interest to the rest of the works is the research laboratory, in which fundamental work is carried out on electrical, physical, chemical and insulation matters. No routine testing is done here and close co-operation is maintained, we were told, with various scientific institutions and research and standardising associations.

Of the other departments, those that seemed to excite most interest were the welding shop, the foundry (on three floors), the measuring room (for investigations calling for fine limits of accuracy), the press shop and the apprentice department, in which training is provided for both boys and girls.



A general view of the motor factory at Rugby

Points from the McGowan Committee's Report

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Non-Statutory Supplies.—Evidence was given showing that in many areas non-statutory suppliers, free from restrictions, were seriously encroaching upon profitable ground, thereby depriving the statutory undertakings of the area of valuable loads. In the area of one large undertaking there are thirty-two of these suppliers with 29,000 consumers and about 5,000 public lamps. The Committee recommends that such supplies should not be permitted without the sanction of the authorised distributors for the areas concerned, such consent not to be unreasonably withheld, and that provision might be made for the acquisition of these undertakings by authorised distributors on a capital cost less depreciation basis.

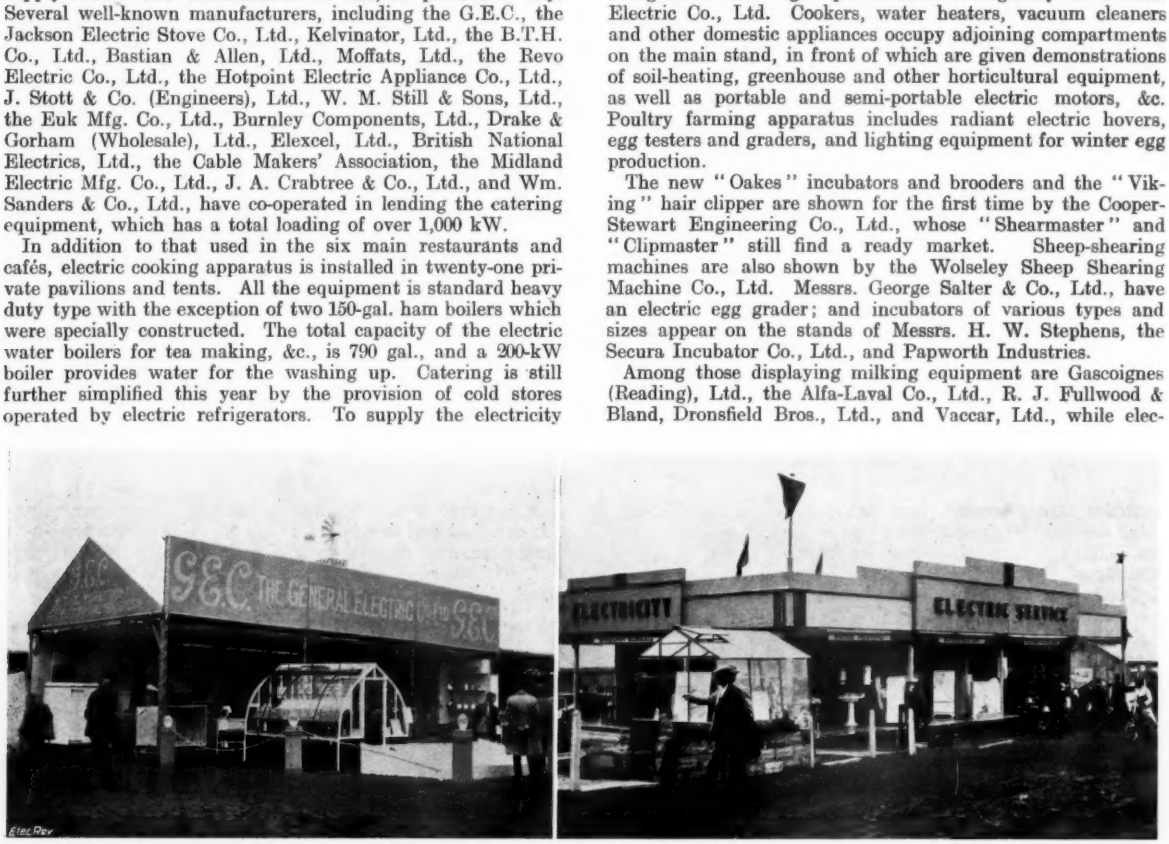
The Rating Question.—The Committee draws attention to existing anomalies with regard to the assessment of electricity undertakings for local rates, making passing reference to the fact that while industrial generating plants are exempted from rates, public utility power stations are not. It is recommended that a uniform method of assessment should apply to all electricity undertakings and that the assessment should be based on an undertaking as a whole.

Compensation for Loss of Employment.—It is considered that the development which would follow the adoption of the Committee's recommendations should ultimately require a larger number of officers and servants and improve their conditions. As however, there may be some temporary disturbance of employment, the Committee recommends that legislation for giving effect to its proposals should provide for adequate compensation to officers and servants who may be displaced or whose position may be adversely affected. The opportunity should also be taken of revising the compensation provisions under the Electricity (Supply) Acts which are considered to be not altogether equitable.

Electricity at the Royal Show

THE only public service of lighting, heating and power at this year's show of the Royal Agricultural Society now being held at Bristol is electricity, which for the first time is employed for the whole of the cooking and water heating requirements of the caterers, who are prepared to supply meals and refreshments to 120,000 persons a day. Several well-known manufacturers, including the G.E.C., the Jackson Electric Stove Co., Ltd., Kelvinator, Ltd., the B.T.H. Co., Ltd., Bastian & Allen, Ltd., Moffats, Ltd., the Revo Electric Co., Ltd., the Hotpoint Electric Appliance Co., Ltd., J. Stott & Co. (Engineers), Ltd., W. M. Still & Sons, Ltd., the Euk Mfg. Co., Ltd., Burnley Components, Ltd., Drake & Gorham (Wholesale), Ltd., Elexcel, Ltd., British National Electrics, Ltd., the Cable Makers' Association, the Midland Electric Mfg. Co., Ltd., J. A. Crabtree & Co., Ltd., and Wm. Sanders & Co., Ltd., have co-operated in lending the catering equipment, which has a total loading of over 1,000 kW.

In addition to that used in the six main restaurants and cafés, electric cooking apparatus is installed in twenty-one private pavilions and tents. All the equipment is standard heavy duty type with the exception of two 150-gal. ham boilers which were specially constructed. The total capacity of the electric water boilers for tea making, &c., is 790 gal., and a 200-kW boiler provides water for the washing up. Catering is still further simplified this year by the provision of cold stores operated by electric refrigerators. To supply the electricity



Electrical stands at the Royal Show, Bristol: (left) that of the General Electric Co., Ltd., and (right) the E.D.A. display

required for this and other equipment in use in the Show the North Somerset Electric Supply Co. has installed no fewer than five temporary sub-stations.

As last year, all the steam, hot water and power used in the dairy where the butter-making competitions are held, are provided by means of electricity, and the atmosphere of the Flower Tent is kept fresh by means of electric fans.

With the improved facilities available rural electrification is to-day making big strides, and many of the advantages of electricity on the farm and in the home are demonstrated very convincingly by the Electrical Development Association, a noteworthy feature of whose exhibit is a model poultry farm consisting of full-sized hatching, rearing and laying sheds, with representative types of electric brooders, incubators and water heaters. Information is given regarding the correct artificial lighting for egg production in the winter, and there are demonstrations of egg grading and marking and poultry plucking. Farmers can save much money and get better results by installing food mixing and grinding plant and by providing radiant heating for their pigs, especially during the breeding season.

Electric motors find innumerable uses on the farm and a great deal of unnecessary labour can be avoided by employing electric pumps. Another "investment" advocated by the E.D.A. is a cabinet providing spring cattle fodder all the year round. This section of the exhibit is completed by various dairy equipment, including complete sterilising outfits for the small farmer; an electric boiler connected to a standard chest and washing trough; a cold store suitable for the producer-retailer; cooling, separating and bottling equipment; a cream scalder; bottle washing, filling and capping machines; and ice-cream making apparatus.

The front part of the E.D.A. stand is laid out as a garden with horticultural exhibits such as propagating frames, soil-heating cables and ornamental lake pumps. On the stand proper separate sections, each one decorated with an amusing "I'm Electric" cut-out, are devoted to electricity in the home, refrigeration, water heating, washing equipment, and domestic and industrial cooking. An inquiry bureau is available to answer all questions and the Electrical Association for Women occupies one corner of the stand.

A special feature of dairy appliances, particularly electric sterilising chests and steam raisers of the electrode type, is being made on a large separate stand arranged by the General Electric Co., Ltd. Cookers, water heaters, vacuum cleaners and other domestic appliances occupy adjoining compartments on the main stand, in front of which are given demonstrations of soil-heating, greenhouse and other horticultural equipment, as well as portable and semi-portable electric motors, &c. Poultry farming apparatus includes radiant electric hovers, egg testers and graders, and lighting equipment for winter egg production.

The new "Oakes" incubators and brooders and the "Viking" hair clipper are shown for the first time by the Cooper-Stewart Engineering Co., Ltd., whose "Shearmaster" and "Clipmaster" still find a ready market. Sheep-shearing machines are also shown by the Wolseley Sheep Shearing Machine Co., Ltd. Messrs. George Salter & Co., Ltd., have an electric egg grader; and incubators of various types and sizes appear on the stands of Messrs. H. W. Stephens, the Secura Incubator Co., Ltd., and Papworth Industries.

Among those displaying milking equipment are Gascoignes (Reading), Ltd., the Alfa-Laval Co., Ltd., R. J. Fullwood & Bland, Dronsfield Bros., Ltd., and Vaccar, Ltd., while electric sterilising plant is represented by Messrs. J. W. Woolley & Co., Perkins Clean Milk Equipment, Ltd., and Aveling-Barford, Ltd. A portable type of electric milk cooler, the "Kelmak," is exhibited by Messrs. MacWhirter, Ltd., and other companies who have cooling and refrigerating plant on view.

Two of the largest stands in the Show are those of Messrs. R. A. Lister & Co., Ltd., and Petters, Ltd., who have very representative selections of electric lighting sets, petrol engines, pumping equipment, &c. Oil engines and pumps are also displayed by Messrs. Blackstone & Co., Ltd., Ruston & Hornsby, Ltd., the Metal Agencies Co., Ltd., Bamfords, Ltd., J. & H. McLaren, Ltd., R. Hunt & Co., Ltd., Thomas & Son (Worcester), Ltd., and H. J. Godwin, Ltd. Other displays of electrical interest are those of the British Oxygen Co., Ltd., and Tecalemit, Ltd.

The Association of Consulting Engineers

The annual report of the committee of the Association of Consulting Engineers for the year ended April 30th states that the membership now stands at 136. Nine new members were enrolled during the year and two resigned. In the absence of the chairman, Sir Cyril Kirkpatrick, in Egypt, Mr. J. S. Alford has acted in that capacity. An account is given of negotiations with other bodies with regard to fees and with public authorities regarding the carrying out of consulting work by permanent officials. Evidence was given before the McGowan Committee. The Association, as representing both consumers and producers, submitted suggestions regarding the ascertainment of distribution costs and emphasised the need for local inquiry before the issue of an Order amalgamating or merging existing undertakings. In view of the resignation due to ill-health of Mr. A. H. Dykes from the position of honorary secretary (which he has held since 1909, when the Association was formed), a temporary office at 214, Abbey House, Victoria Street, S.W.1, has been taken until the end of the current year, Mr. J. Raffety, who has been associated with Mr. Dykes for several years, acting as hon. secretary for the present.

Poultry Farming. By F. E. Rowland, A.M.I.E.E.

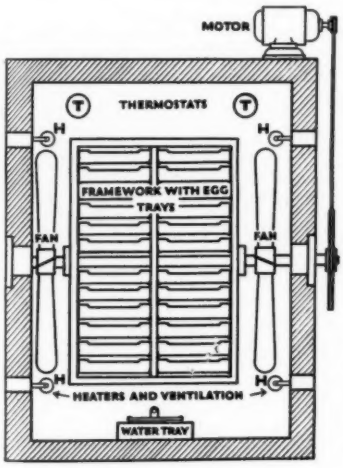
Varied applications of electricity and their results in practice

THERE is no section of agriculture in which electricity can be used more extensively than in poultry farming. The importance of the poultry industry is reflected by the fact that the estimated value of eggs and poultry produced in Great Britain and Northern Ireland during 1933 was £33,000,000, nearly 30 per cent. more than that of grain during the same period. During the eight years ended 1933 the number of fowls in England and Wales increased by no less than 80 per cent. and the egg production by 114 per cent. Rapid expansion is closely linked up with electrical methods because for large scale incubating and brooding electricity is practically essential.

Incubation Practice

Artificial incubation has been practised for many centuries in both China and Egypt.* In both countries special buildings are used, and in China an establishment with an egg capacity of 36,000 is recorded, while in Egypt at the census prior to 1924 there were 628 establishments with a capacity of about 42,000,000 eggs annually.

Modern incubators, as used in western countries, date from the invention of the capsule temperature regulator by Charles Hearson in 1882 and his use of a water tank for heating the upper surface of the eggs with a supply of moistened air rising from below. Small incubators accommodating up to about 200 eggs have been extensively employed during the past forty or fifty years, the usual method of heating being by oil lamps, but with the advent of electricity a cylindrical conversion heater, arranged to replace the oil lamp in the flue, came into use, the existing capsule being employed for temperature control with a suitable make and break contact. Electric heating eliminates refuelling, smoke and fumes, provides fully automatic temperature control and reduces fire risk.



Typical lay-out of a cabinet incubator (H, heaters; T, thermostats)

In recent years a fundamental change in incubator practice has been brought about by the introduction of mammoth or cabinet incubators, the number of eggs accommodated ranging from 500 to 20,000, 30,000, or even 70,000. Cabinet incubators are generally heated with wire-wound electrical elements, although hot-water pipes supplied by an external boiler employing either electrical immersion heaters or an oil lamp have been fitted. An essential feature is the provision of means for keeping the air in circulation so as to maintain the correct temperature throughout; this is effected by mounting impellers in the interior with an external motor to drive them, but in one design fans with integral motors are fitted inside the incubator. The eggs are placed in trays which are housed in a framework with arrangements for turning them by displacing the trays through 90 deg.

A radiant hover

The usual operating temperature is 100 deg. F., which is maintained within ± ¼ deg. F. by means of thermostats of the capsule, invar-rod or bi-metallic type. Owing to the large number of eggs accommodated in one incubator, comparatively expensive control gear can be used, and it is claimed that the close control of temperature, humidity and other factors in cabinet incubators has resulted in the weight of chicks when hatched being greater by 1½ lb. to 2 lb. per 100. In the event of failure of supply a modern cabinet incubator will retain its temperature for several hours, and risk of loss can be covered by insurance.

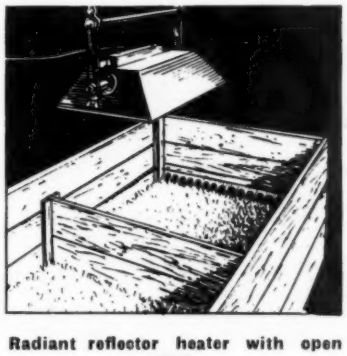
The following statistics are from "What Electricity is doing in the Country," by M. M. Harvey (E.D.A.). The table shows that the proportionate first cost and operating expenses of cabinet incubators decrease considerably as the capacity increases.

CABINET INCUBATOR STATISTICS

Egg capacity.	Price.	Total loading.	kWh per day.			Per 100 eggs.		
			Fans.	Heaters.	Total.	Price.	Loading.	kWh per day.
	£	W.				£	W.	
720	62	770	4.5	3	7.5	8.6	107	1.04
1,440	100	1,150	7.0	3 to 4	10 to 11	6.95	80	0.73
2,800	118	1,270	7.0	5 to 7	12 to 14	4.2	45	0.46
5,760	175	1,500	7.0	8 to 10	15 to 17	3.0	26	0.28
10,000	270	2,080	7.0	14 to 16	21 to 23	2.7	21	0.22
12,000	290	2,200	7.0	15 to 16	22 to 23	2.4	18	0.19
16,000	360	2,600	12.0	15 to 17	27 to 29	2.25	16	0.175
20,000	410	2,900	12.0	16 to 18	28 to 30	2.05	14.5	0.145

Chicken brooding falls roughly into two categories, namely, hovers and battery brooders. Electric heat (either radiant or converted) is used with both systems. Another method which is essentially electric employs radiant reflector heaters suspended over partitioned runs.

As in the case of incubators, a demand arose with the spread of electricity for the conversion of hovers and foster mothers from oil to electric heating. Better hygiene, due to the elimination of smoke and fumes, and the saving of labour for refuelling and trimming lamps, are particularly advantageous in chicken brooding, and chicks definitely do better than when other means are employed.



Radiant reflector heater with open run

Electric heating may be applied in hovers by means of carbon-filament lamps mounted over the chicks to produce radiant heat; this system is used on a considerable scale, particularly in Lancashire, where it originated. It has been found that the continuous light with this system might disturb the chicks, but this is not the case with suitable management. The advantages of this method, apart from the benefits of radiant heat, are low first cost, reliability and ease of temperature control. Hovers may also be heated with dull wire elements applied in a similar manner to lamps, and a thermostat may be employed for temperature control.

The consumption of electricity for brooding in hovers as a rule works out at approximately ¾ to 1 kWh per chick for a brooding period of eight weeks, depending on the time of the year, the weather and the situation of the brooder; a satisfactory loading for well-designed hovers is a maximum of about 1¼ to 1¾ kWh per chick, which with three-heat control gives the figures in the following table.

THREE-HEAT LOADINGS FOR BROODERS

Chick capacity.	Watts loading.		
	Full.	Medium.	Low.
100	175	88	44
150	260	130	65
250	350	175	88

Successful results have been obtained with radiant reflector heaters suspended over the chicks in partitioned runs, but this system is less economical in operation than hovers in which the heat is concentrated in a smaller space.

COMPARISONS OF INSURANCE PREMIUMS

		Construction.	
		Fireproof.	Not fireproof.
*Brooder houses:	Oil	5/–%	10/6%
	Electricity ...	3/–%	7/6%
*Incubator houses:	Oil	5/–%	—
	Electricity ...	3/–%	—
Incubators:	Oil	10/6%	
	Electricity ...	7/6%	

* Includes buildings, fixtures and utensils.

* Ll. B. Atkinson. Journal of the Royal Society of Arts. No. 3738, November, 1924. "The Scientific Principles of Artificial Incubation."

Battery brooders consist of a number of units, up to about six, set one above the other. This arrangement leads to great saving in space and labour, as a very much larger number of chicks can be housed in a given area than with ordinary hovers. The most satisfactory method of heating is by means of separate thermostatically controlled heaters in each partition. The reduction in fire insurance premiums when electricity is used is shown in the table on page 9. The rates are specially agreed for property belonging to members of the Scientific Poultry Breeders' Association and the Lancashire Utility Poultry Society.

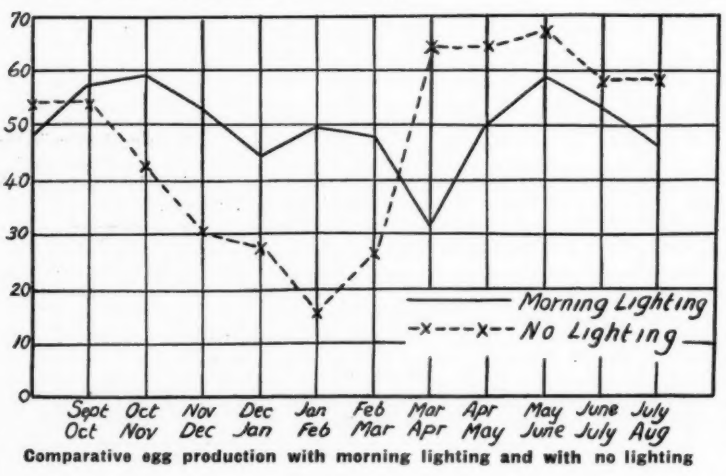
ANALYSIS OF LIGHTING TESTS

	No lighting.	Morning and evening lighting.
Income	17/2½	£1/2/1
Food	6/2	6/8½
Lighting	—	–/7½
Margin over food cost and lighting	11/0½	14/8½
Egg yield	154.8	183.4
Percentage yearly production	46.07	54.58
Average egg weight, drams	31.4	31.2
Percentage first grade eggs	50.7	46.8
Total food consumption	70 lb. 12 oz.	77 lb. 4 oz.
Average daily food consumption	3.37 oz.	3.68 oz.
Average body weight, start	3 lb. 3.9 oz.	3 lb. 4.2 oz.
Average body weight, end	3 lb. 9.3 oz.	3 lb. 13.5 oz.
Gain	5.4 oz.	9.3 oz.
Mortality per pen	9	9

The object of lighting poultry houses is to increase egg yield during the winter months when prices are high, by lengthening the period during which the birds can eat; the increased egg production has no harmful effect on their health. The total annual production is not materially affected, because there is a decrease during the summer, but this is not important, as prices are then low. Poultry house lighting may also be used for fattening birds in order to reduce the time of preparation in the winter. The domestic chicken originated in the tropics, where the hours of daylight are practically the same throughout the year, consequently this treatment is not a radical departure from natural conditions.

Reflectors are used to direct the light on to the scratching floor, the British Standard type being the most satisfactory. Illumination of the order of 2 ft.-candles, with a minimum of 1-ft.-candle, on the scratching floor is recommended, while for dim lighting 0.1 to 0.2 ft.-candle is sufficient. Some direct light should fall on the perches to waken the birds when lights are switched on in the dark, and to enable them to return to roost when the lights are dimmed at night, while patches of shadow on the floor into which birds might stray and not return to roost must be avoided.

Morning lighting is employed from about 4 a.m. to day light. A simple and cheap form of automatic control may be used for switching on the lights, as a dim period, although advisable, is not essential, and they may be switched off manually after dawn. As the load is in the early morning, an off-peak tariff may be obtainable. An objection to this system is that food left out all night for morning consumption is liable to encourage vermin. Evening lighting from dusk to about 7 p.m. is frequently more convenient as regards labour, but as it comes at the end of the day when the birds are tired, its effect may not be as stimulating.



Comparative egg production with morning lighting and with no lighting

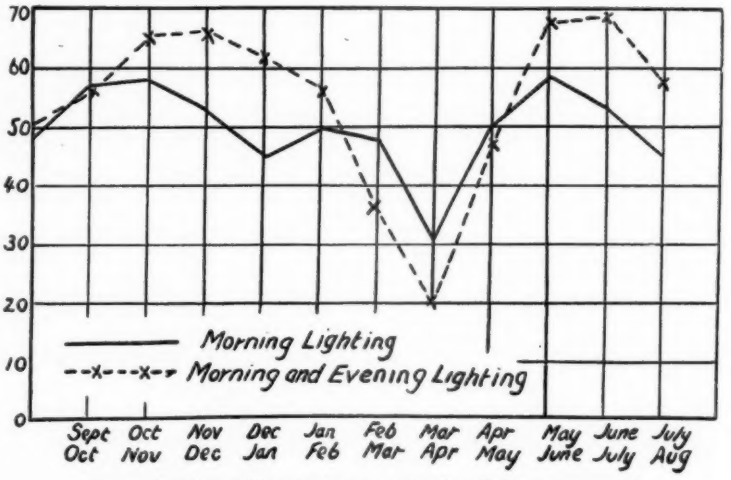
Tests have shown that morning and evening lighting gives better results and has the advantage that the lighting period is the same throughout the season, because the seasonal variation in the rising and setting of the sun can be allowed for. Evening-lunch lighting consisting of one or two hours illumination at about 9 or 10 p.m. or later is used extensively, but necessitates automatic control gear.

Good results are claimed from all-night lighting, which has been employed in the United States. Illumination is provided only to enable the birds to find the feeding hopper and drinking fountain, and to return to roost.

Methods of Control

A period of dim illumination is usually provided for about twenty minutes when switching off the lights to enable the birds to return to roost; if the lights are switched off suddenly the birds may become alarmed and injure themselves, or they may remain on the floor during the night risking attack by vermin or the contracting of disease. A dim period is also advisable when switching on in the dark to avoid startling the birds. Most authorities consider that one degree of dimming is sufficient, although some farmers prefer graduated dimming over a period as long as ten or twenty minutes. This practice is rare as it entails either tedious manual control or elaborate and expensive automatic apparatus.

The principal methods employed for dimming are: fixed resistance; a two-circuit system (one with 15-W lamps for dim illumination); series-parallel wiring; and graduated-resistance control.



Egg production with morning and evening lighting compared with morning lighting only

Tests carried out at the National Institute of Poultry Husbandry, Newport, Salop, show the egg-production with morning lighting compared with no lighting, and with morning and evening lighting compared with morning lighting only. In the first case egg-producton was greater from October to March (when prices are high), while with morning and evening lighting there was a further increase between October and February.

The foregoing tests were carried out in pens each containing 120 single-comb white leghorn pullets, and the summary of averages per bird for forty-eight weeks is illustrated by the curves reproduced herewith.

Poultry, particularly laying birds, may be treated with ultra-violet light to counteract a deficiency in sunlight and to promote the assimilation of vitamin D. This practice has not been used to any extent commercially, partly because vitamin deficiency can be counteracted by cod liver oil. Considerable research work has been carried out, however, and it is claimed that the condition of the birds is improved, and that the vitamin content and consequently the food value of the eggs is increased.

Various sources of ultra-violet light have been tried, including quartz-mercury tubes and tungsten-mercury lamps, the former giving more powerful irradiation and the latter eased application and simplicity in operation. The results of experiments carried out by the Poultry and Chemistry Division of the Experimental Station, Wisconsin, are summarised in tabular form.

(Concluded at foot of next page.)

The Generation of Peak Loads.

By Vernon Walker, A.M.I.E.E.

Methods of meeting the operating conditions

WITH the advent of the grid, peak loads are being dealt with by the smaller selected stations. During the winter certain of these may take only the highest peak of the load curve, while others will run at an economical load for one or two shifts per day. Light loads may have to be carried to enable such stations to pick up a large share of the system load if required.

The consequent low load factor has a detrimental effect on both turbine- and boiler-house records. Again, usually the plant so operated was not designed originally for the specific purpose of taking peak loads. The loading of a large system depends upon many variables that are difficult to predict. Changes in the working hours of the people have flattened the load curve in the early hours of the morning, and the increased use of electricity for power and domestic purposes has modified the peak which used to occur on winter afternoons.

The allotment of a definite loading programme in advance to the various power stations can reduce to some extent the losses due to peak-load conditions. Sudden changes due to rain clouds, fog and temperature variations cannot be dealt with in this manner, for the load which results must be carried often with only a few minutes' interval with the assistance of smaller machines which may not be in service at the time. It is, therefore, of first importance that the plant in these stations should be capable of quick starting and flexible operation.

The Modern Boiler House

With regard to the boiler house, it is possible to raise normal working pressure from banked conditions and to attain maximum output in some 12 to 18 min. from commencing operations with a modern stoker-fired boiler. Pulverised fuel or oil will be even quicker in getting a boiler away. Stoker-fired units fitted with auxiliary oil burners can reach maximum output in about eight minutes from banked conditions, assuming that the steam pressure is three-quarters working pressure. Boilers fitted with the older classes of stoker may, however, take thirty to forty-five minutes before any appreciable load can be carried. The minimum time required to bring a boiler into service from cold is not easily stated in general terms to cover all installations. Dealing, however, with units having superheaters placed close to the fire, and with large boilers for high ratings, 1½-3 hours should be the minimum time. With high pressures and the greater thicknesses of the pressure parts, such as drums, it is considered better practice to bring the units up to temperature and pressure slowly in order to avoid differences in temperature between drums and tubes. Supplementary oil burners, capable of bringing a boiler up to working pressure, have been used for large pulverised-fuel boilers. This method improves furnace conditions in starting, and eliminates the old-fashioned lighting torch.

Quick response to sudden load variations is illustrated by a case of a p.f. boiler in an American power station acting as a "peak load" station to a hydro-electric plant. Due to faulty transmission lines the ties between the hydro-electric plant and this station were disconnected, the load increasing from 10,000 to 29,000 kW. The boiler in use at the time was steaming at 130,000 lb. per hour, which was increased to 300,000 lb. in one minute, in three minutes to 400,000 lb., and in eight minutes to 440,000 lb., by which time one of the transmission lines was cleared, and the load transferred to the hydro-electric plant. The steam pressure during this period of eleven minutes dropped only from 440 to 380 lb., after which the station was back on its former load.

Modern stoker plant is remarkably flexible in comparison with plants of a decade ago. A boiler started up from cold has carried 80,000 lb. per hour twenty minutes later. Steam accumulation has also been employed to enable the boiler plant to get over the peak. The coal used for banking and lighting up boilers for providing a reserve capacity in a base-load station may vary from 1 to 2 per cent. of the total coal burnt, but in stations where fires are banked for long periods the loss may amount to between 6 and 12 per cent. The no-load consumption of the average power-station boiler, having an evaporation of between 60 and 120,000 lb. per hr. necessary to maintain three-quarters working pressure, varies from 1 to 4 per cent. of full load consumption, an amount which will be equal to 70 to 350 lb. of coal per hour. Raising steam in a cold boiler requires one ton of coal per 2,000 gal. of water capacity, or 670 lb. per 10,000lb. evaporative capacity. These losses vary with the furnace conditions and general design of the plant.

After the Peak

Considerable losses are also incurred, which are seldom taken into account, in bringing banked boilers to full load and maximum efficiency and letting them back to banked fire condition after the peak has passed. From tests it has been ascertained that after banking a boiler for twelve hours, two to three hours' steaming is necessary to bring the unit back to its normal state of efficiency, the losses being slightly in excess of those necessary to keep the fires banked.

When starting up superheaters the operator has to provide the circulation required to keep down the metal temperature, which may reach as much as 1,100 deg. F. or more when being hastily fired, and before steam is flowing through the tubes. The old precaution of flooding superheaters while raising steam has been found unnecessary so long as enough steam is circulated through the superheater by opening the drains.

Excessive temperature may also occur throughout the economiser during starting-up periods, as practically no water is then needed, that in the economiser being quickly turned into steam. When the boiler is put on the line and the feed valve opened, the tubes may be cooled very rapidly, resulting in distortion and leakage of the joints. To avoid this trouble a small connection has been taken from the boiler or water-wall headers to the inlet of the economiser, allowing sufficient water to circulate through the economiser to replace the water flashed into steam. An economiser "protector" has also been used; this consists of a multiple-float regulator arranged to connect the economiser outlet with the steam or water space of the boiler. If steam is formed in the economiser the branch leading to the boiler steam space is opened allowing it to escape. After the pressure has been balanced water is admitted to the inlet of the economiser to replace the steam.

Rapidity of corrosion and fouling of air preheaters, especially on the gas-discharge side, increase in the case of boilers shut down over considerable periods and under banked fire conditions, as the gases may then be below the dew point temperature. If the air is wholly or partly by-passed around the heater, the gas exit temperature may be kept high enough to prevent corrosion. Dimensional changes which take place in furnace brickwork on rapid heating and cooling cause cracking and splintering, and pieces become completely detached. Brickwork should be heated and cooled slowly, especially under 800 deg. C. With water-cooled arch and side walls care should be taken on starting fires that loss of ignition does not occur by too rapid increase in grate speed. The short ignition arch in some furnace designs increases this difficulty.

In starting turbines, the rate of picking up load depends on the temperature of the turbine casing. Provided that normal working temperature has been obtained, no ill-effects from sudden application of load need be expected. In this respect single-cylinder machines may be considered superior to double-cylinder ones. The period of preparation from the moment of receiving the order for starting up until the stop valve is opened may be from five to thirty minutes, and the time from

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Poultry Farming (*Concluded from preceding page*)

The egg production with cod-liver oil, which was used as 2 per cent. of the ration (pen 8) was practically as good as with the quartz-mercury lamp (pen 2). However, the hatchability records are higher with the lamp, which in turn compares unfavourably with pen 3, in which the benefit of the lamp and sunlight were both secured. The lamp also gave an increase in hatchability of 10 per cent. as compared with the cod-liver oil ration. As ultra-violet irradiation is to counteract sunlight deficiency, the benefits will be greater in districts where sunlight is rare during the winter.

WINTER EGG PRODUCTION DATA. AVERAGE OF FIVE YEARS' TESTS

THIRTY PULLETS IN EACH GROUP.

Pen.	Conditions in pens.	Average winter egg production.	Hatchability records. March eggs.
1	House with glass front closed	2,059.8	13%
2	Glass front closed, with quartz-mercury lamp	3,159.2	59%
3	Glass front opened, with quartz-mercury lamp	2,975.8	65%
4	House with glass front opened to sunlight	2,728.0	45%
5	Glass substitutes, wire screen base type, four trials, front closed	2,656.2	45%
6	Quartz glass front, closed, four trials ...	2,877.7	45%
7	White cloth frames, front closed, three trials	2,415.6	23%
8	Glass frontclosed, and with cod liver oil...	3,086.8	49%

Lamp used in pen of 30 hens 30 minutes per day.

opening the stop valve to attaining full speed five to ninety minutes according to the size of plant and to the extent to which the machine has been cooled when out of service. Generators of from 20,000 to 30,000 kW are gradually loaded to full capacity within from fifteen to thirty minutes after being synchronised. In emergency a 30,000-kW machine has been brought up to speed and fully loaded within fifteen minutes.

Power Stations of the Future

The design of power stations in the future will probably depend on whether they are to operate on base or peak loads, the capital cost of the second kind being as low as possible, even though economy in operation is sacrificed, since the cost of generating a peak load is mainly made up of capital charges. The boiler plant will no doubt be proportioned for economic operation at moderate loads, efficiency being sacrificed to some extent during the peak. Larger economisers will take the place of a combination of economisers and air heaters, as the feed water will not be raised to such a high temperature by bleeder heaters. High-pressure plant designed for base-load conditions will give a high efficiency up to full capacity, which justify wider boilers with low draft losses, reduced pressure drop, and tendency of slagging the tube banks.

Professor F. G. Baily has suggested that generation should take place at the pit head. Generation in the coal field appears to offer advantages at low load factors, as, although large quantities of circulating water are not always available there, economy in operation need not be the determining factor. The grid would, moreover, make such a practice more feasible. In Switzerland, Germany and U.S.A. water power has been the means of supplying base loads, steam stations acting as stand-by. In Britain water-power resources are comparatively small, but several of the Scottish hydro-electric stations may be classed as base-load stations, although the Galloway water power scheme will enable peak loads to be dealt with, the conditions for meeting a winter peak (when more water is available) being favourable. The most economical solution of the peak-load problem will perhaps be the installation of specially designed plant in the smaller stations, where the cost per kW may be reduced owing to local conditions.

Municipal Transport

Proceedings at the Bournemouth Conference

ALDERMAN H. CLARK, J.P. (Chairman of the Rochdale Transport Committee), presided over the thirty-fifth annual conference of the Municipal Tramways and Transport Association, at Bournemouth, on June 24th, 25th and 26th. Representatives of eighty-nine of the ninety-five municipal transport undertaking members of the Association attended. There were receptions by the Mayor, and by Alderman Summerbee and Councillor Langton, in addition to the annual dinner.

A view of Bournemouth Square showing some of the trolley buses which the Corporation is successfully operating

Facilities were also provided for an inspection of the Bournemouth Corporation trolley vehicles and system.

Following the civic welcome by the Mayor (Ald. H. G. Harris), at the opening of the proceedings on June 24th, at the Municipal College, Alderman Clark delivered his presidential address. The President then presented cheques and medals to the successful candidates in the Association's eleventh annual essay competition.

At the annual general meeting which followed, the following officers were elected for the ensuing year:—President, Mr. C. Owen Silvers (manager, Wolverhampton); vice-president, Alderman A. H. Gledhill, J.P. (chairman, Halifax); hon. treasurer, Mr. R. S. Pilcher (manager, Manchester); hon. solicitor, Mr. F. C. H. Wiltshire (Birmingham); auditor, Mr. H. Moxon. It was announced that Messrs. A. T. Eardley and L. MacKinnon had been elected honorary members.

Transport Costs

ALDERMAN A. H. GLEDHILL (chairman, Halifax), presented a paper on "The Relation of Capital Charges, Frequency of Service and Efficiency of Demand to Transport Costs." One object of the paper was to enable the fixed capital charges for any route to be ascertained by reference to frequency of service. Data were given in support of the following comparative figures for various types of vehicle for a town service of 40,000 miles per vehicle per annum, with a one-minute frequency of service. Tramcar: cost £2,200, life 15 years, capital charges per mile, 1.19d. Trolley-bus: cost £2,250, life 10 years, capital charges per mile 1.64d. Double-deck petrol bus: £1,650, life six years, capital charges per mile, 1.85d. Single-deck petrol bus: £1,350, life six years, capital charges per mile 1.51d.

For overhaul, equipment and permanent way for the tramcar the figure should be increased by 0.72d., making a total of 1.91d. per vehicle mile, though reduction of debt on existing equipment has reduced the amount to 0.64d. For trolley buses the capital charges on overhead equipment was taken at 0.2d., making a total of 1.84d.

The hundred-seat-mile basis of costing was attacked and was said to favour unfairly the trolley vehicle. Capital charges per mile were eliminated to provide the proper basis. Operating expenses per mile (from the Ministry of Transport Return for 1934-35) were: Tramways 12.23d., trolley buses 10.79d., motor buses 7.81d.

The paper concluded with a statement of the case on broad national grounds for the use of oil fuel.

Mr. C. OWEN SILVERS (president-elect) who opened the discussion, said that although twenty years was allowed for repayment of overhead equipment loans, renewals of overhead wire and fittings were usually charged to repairs, so that capital charges on a fifteen years basis would more than cover the life of the wasting asset. There was no justification for treating the cost on a sliding scale according to the frequency of service as the poles and concrete and feeder cables lasted as long, whether one ran a one-minute or a thirty-minute service. Quotations he had obtained for vehicles identical in size, seating and equipment, gave £2,010 for the trolley bus and £1,920 for the motor bus. Assuming for the trolley bus a life of eight years, and for the motor bus six years, capital charges for the trolley-vehicle would be increased to 1.7d., and for the motor bus to 2.13d. per mile. On that basis the capital charges per mile on the two types of vehicle coincided at a five-minute frequency of service. He believed that the hundred-seat-mile factor could still be used with accuracy.

Mr. T. P. SYKES (manager, Rotherham), stated that on the oldest route in Rotherham (where trolley-buses had been operating for twenty-five years), the poles had been reinforced recently, and the overhead equipment was good for another twenty-five years. A feeder cable laid in bitumen thirty years

ago still had good insulation. He was installing high-voltage cable, which cost only a little more, and the expectation of life was nearer sixty years than six. At least seventy per cent. of the outlay on overhead equipment related to almost permanent works. As to extra mileage lowering the operating cost per mile, Mr. Sykes said that a higher schedule speed did not mean necessarily extra mileage, but the ability to run a service with fewer vehicles. On a route having many stops one could operate a trolley vehicle at a higher schedule speed than a petrol bus, and thus save men and buses.

ALDERMAN C. E. TATHAM, J.P. (chairman, Blackpool Transport Committee), suggested that reasonable average annual mileages would be 25,000 for tramcars, 30,000 for trolley buses, and 35,000 for oil buses, giving capital charges per mile, of 1.9d., 2.15d., and 2.11d. Average seating or carrying capacity should be taken into account; a tramcar might have 84 seats, but not a trolley bus or oil bus.

MR. W. VANE MORLAND (manager, Leeds), alleged that the hundred-seat basis had been used to justify the often misleading propaganda on behalf of the trolley bus. Each route had to be considered on its merits. In certain cases, but certainly not all, the trolley bus was ideal.

MR. H. C. GODSMARK (manager, Huddersfield) argued that the hundred-seat-mile basis of comparison was not fallacious. MR. J. M. CALDER (manager, Reading) related his experience with trolley wire (the most rapidly wearing item) which lasted fourteen years with a three-minute service. The author, he asserted, had compared revenue per mile, with the revenue per seat-mile.

COUNCILLOR H. W. BARBER (chairman, Southport) believed that if further taxes were imposed on the motor bus industry on oil fuel and in other ways, undertakings would be faced with losses. COUNCILLOR J. H. WHITAKER, J.P. (Todmorden) produced statistics in support of a statement that five times the mileage could be obtained per unit of capital employed with petrol buses than when trams were used.

ALDERMAN T. WOFFENDEN (Huddersfield) said that in his town the public was clamouring for every route to be converted to the trolley-vehicle system. ALDERMAN R. WINTERBOTTOM (chairman, Burnley, Colne and Nelson Joint Transport Committee) suggested that where company and municipal undertakings worked alongside, if their operating peaks did not coincide they should use each other's vehicles during their peak hours, thus improving the "load factor."

ALDERMAN GLEDHILL, in reply to the discussion, said that the information obtained from managers having trolley bus fleets, was to the effect that the average life of the wire at city centres was six years. Transport was developing very rapidly, and any system which could not show a profit without increasing the borrowing period beyond ten years should not be considered. The Halifax undertaking was buying double-deck oil-engine buses at less than £1,650.

Mr. Craven, the manager at Halifax, had informed the Tramways Committee that the cost of electricity for trolley buses in the hilly district of Halifax would be more than the present combined costs of fuel oil, repairs and maintenance. By assuming 40,000 miles for both the tram and the trolley, he had been more favourable to those vehicles than to the motor bus. For years the electrical authorities had been pressed in vain to reduce the price of energy. Having lost a considerable amount of the load, they were attempting to go behind the transport committee, which should be the sole advisory committee to a corporation on transport matters, by propaganda among other councillors and ratepayers who had no technical knowledge of transport matters.

On Thursday morning a paper was read on "Fares and Their Control," by MR. C. A. HOPKINS (manager, Sunderland), and in the afternoon one on "Bus Parking—Night and Day," by MR. C. JACKSON (manager, Plymouth). The latter paper dealt with garage layout and accommodation, but the discussion mainly turned upon the disorganisation of traffic caused by the parking of private cars in busy thoroughfares. Evidence was given by MR. W. G. MARKS (manager, Liverpool) that the prevention of parking during an hour at the time of the Saturday peak load had speeded up the trams by four minutes between the pier head and the Lime Street area—a distance of little more than a mile.

The Annual Dinner

The annual dinner, which was followed by a dance and cabaret, was held on June 25th at the Burlington Hotel, Boscombe. Responding to the toast of the Association, which was proposed by the Mayor, the President said that last year the undertakings represented in the Association had carried 4,272 million passengers, representing at least 100 journeys for every citizen in Great Britain.

Alderman A. H. Gledhill, J.P. (vice-president-elect) proposed "The Bournemouth Corporation Transport Committee" and Alderman F. B. Summerbee (chairman of the Bournemouth Transport Committee), who responded, said that when he became chairman of the Committee six years ago, the capital debt on the tramway undertaking was £311,000. The public in Bournemouth were clamouring for the abolition of tramways, and he had had to hold them back a little. Even in March, 1936, after the change-over was effected by Mr. D. P. Morrison and his staff (the work took twenty-one months), there remained a debt of £75,000 on the old tramway undertaking.

Mr. C. Owen Silvers (vice-president) proposed the health of Mr. A. R. Fearnley, who had retired from the office of hon. treasurer of the Association, and would retire shortly from his post as general manager of the Sheffield undertaking. He was one of the twenty present at the original meeting of the Association in 1902; since that time he had been continuously a member of the Council and had filled every office, having been president in 1912-13, hon. secretary for some years, and hon. treasurer since 1917. On behalf of the Association, Mr. Silvers presented to Mr. Fearnley some travel coupons.

Mr. Fearnley, in his response, said he hoped to make use of the travel coupons by investigating public-transport practice in the United States. No municipality operating transport could afford to be outside the Association, nor could it afford to be outside the Joint Industrial Council.

The E.C.A. at Folkestone

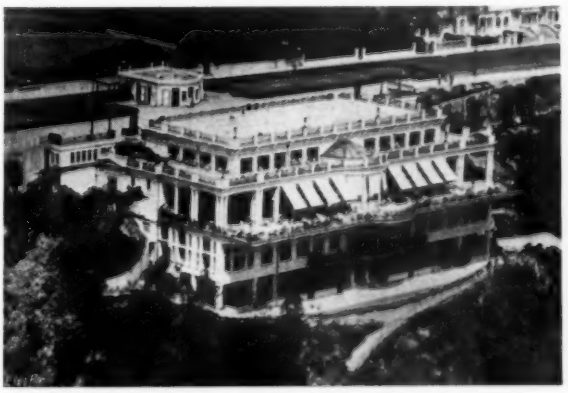
THE series of annual conferences of the Electrical Contractors' Association was interrupted last year by the National Electrical Convention, the contractors merging their own function in the general gathering. Consequently the members appear to be determined to make up for this hiatus by rallying in good numbers to this year's conference, which commences on Wednesday next.

In choosing Folkestone as the meeting place the organisers are to be congratulated since its numerous attractions can be guaranteed to fill in pleasantly any odd moments not occupied by Conference business.

Except for the fact that the order of the proceedings has been slightly changed, the programme of the Conference both with regard to business and social meetings is on very much the same lines as on previous occasions. A meeting of the Council of the three associations (E.C.A., N.E.C.T.A., Ltd., and the N.F.E.A.) opens the proceedings on Wednesday morning. Registration at the Metropole Hotel takes place in the afternoon and evening, a reception by the president, Mr. A. G. Bruty, and Mrs. Bruty, being planned for the evening.

On Thursday, after a civic welcome by the Mayor of Folkestone at the Leas Cliff Hall, Mr. Bruty is to deliver his presidential address. Further Conference business will occupy the afternoon, and a ball and supper will be given by the Mayor is to be held at the Leas Cliff Hall in the evening.

Time will be provided at Friday morning's annual general meeting for a general discussion of matters of interest to the Association, when we anticipate that some views on the McGowan Report will be ventilated, and following his installation the new president, Mr. H. M. Drake, will give a short address. In the afternoon there will be a garden party at the Lympne estate of Sir Philip Sassoon, while the Conference will conclude in the evening with a smoking concert and dancing at the Metropole Hotel.



The Leas Cliff Hall, Folkestone

Correspondence

Contributions from readers are welcomed. The writer should give his name and address, not necessarily for publication

Safety in the Home

The two letters published in your issue of the 26th instant under the above heading are not very helpful from my point of view because they hint plainly that all is not well in regard to the design of domestic apparatus. To the mere woman the fact that electricity has made the premier place for itself in our homes, completely routing all competitors and removing the risk of explosion, suffocation and worse, is sufficient for us to award it the first prize.

But no, we are told that this apparatus, although in our opinion well behaved, is actually the lurking place of danger in the shape of electric shocks to the user, fatal or otherwise, and that although a device called a three-pin plug is guaranteed to minimise that danger in some circumstances, in others it will make the danger more likely.

Will someone please give me the correct answer, so that my students can go out into the world equipped with the knowledge necessary to recommend electricity to all and sundry as the source of health and safety in the home?

HELEN MINOPRIO,
Principal, London School of Elec. Domestic Science.
London, S.W.3, *June 30th.*

Small Undertakings and the McGowan Report

The McGowan Report has come to daylight at last, and the local engineer has been left in a state of bewilderment. At the recent I.M.E.A. Conference it was interesting to see the Council of that body looking as prosperous as ever, but did they give a thought to the small supply undertaking engineers in the audience?

The Committee mentions in paragraph 466 (page 80) that there will probably be a reduction in the number of chief engineers and managers, and it is obvious that it is intended to get rid of some at all costs. As one in the prime of life, not desirous of receiving a pension at the public expense, I do not contemplate with pleasure the prospect of being relegated from active service to enforced idleness.

It is hoped that there will be strong opposition to the recommendations submitted, and that every engineer in the country will urge his committee to ask the Member of Parliament for his area to oppose the proposals. The Committee's recommendations aim at killing all initiative. If nationalisation has become necessary, why not nationalise the gas and water concerns? Evidently gas will be allowed to pursue its own course and manage its own business, while electricity, because of its prosperity, is to become a victim. Why should the present generation set up machinery which the next generation will not require? However, perhaps the Report will be quietly pigeon-holed. GASSED.

June 29th.

[It has been necessary to abbreviate this letter.—EDS., ELEC. REV.]

Overhead Lines and Thunderstorms

I should be glad if any of your readers could advise me upon the following matter.

During a recent thunderstorm one of my clients in a rural district supplied by overhead lines rang me up and told me he had seen sparks jumping across from the live terminals to the earthed terminal in a 15-A double-pole interlocked plug. As my client is rather disturbed by the occurrence, I should be very grateful for any assistance you could offer.

June 24th. TWENTY YEARS A READER.

The Bradford Breakdown: Mr. Nimmo's Report

THE chief engineering inspector of the Electricity Commissioners (Mr. H. Nimmo) has issued his report (H.M. Stationery Office, 5s. net) on his inquiry into the cause of the breakdown which occurred at the Valley Road generating station of the Bradford Corporation (chief engineer: Mr. T. Roles) on February 24th last, which resulted in serious damage by fire to buildings, plant and cables, and in an extensive interruption of supplies of electricity to consumers.

The station contains 102,000 kW of generating plant. The maximum demand had reached 44,890 kW and at 6 p.m. the load was 42,000 kW, of which 7,000 kW was being "exported" through the adjacent grid sub-station. The report states that the primary cause of the breakdown was the failure at 6.9 p.m. of the red phase orifice insulator in the current transformer chamber of a group feeder switch. The resulting electrical flash-over caused burning of the conductor, the insulator and the metal casing, and allowed burning oil from the c.t. chamber to blow out and damage the lower bus-bar orifice insulator immediately above it.

Although this first fault was outside the zone of protection, the circuit-breaker of the switch affected tripped. This has not been satisfactorily explained. It caused two-thirds of the station auxiliaries to be shut down; the output and frequency dropped, converting the "export" into an "import" of 30,000 kW.

Meanwhile the original fire had been extinguished in six minutes, but nine minutes after the first fault the damaged insulator in the lower bus-bar orifice immediately above the orifice first damaged broke down and the consequent explosive electrical flash-over restarted the fire. These two failures caused heavy earth currents to flow through the two neutral earthing points at the grid sub-station, so burning out the earthing transformer at the time the second fault occurred. All switches were tripped by hand and the station was completely shut down.

The report states that, apart from the failure of the c.t. orifice insulator on the switch first affected, there was no other defect in the equipment, either at the generating station or at the grid sub-station. The failure of the c.t. insulator was not due to any defect in the insulator itself, but to the use of Keene's "cement" (sealed at the end from which it was introduced with litharge and glycerine cement) at the time of manufacture. This substance (plaster) was used to fill the narrow channels between the insulator and metal casing. It probably contained an undue amount of moisture (for mixing) which deteriorated the bakelised paper insulation.

Apart from this, the report states, the metal-clad switchgear was well designed and made of materials of the best quality by a firm of great repute. The inspector expresses the opinion that there is no possibility of a similar breakdown occurring again, since all weak orifice insulators at the Valley Road station have since been changed.

The protective equipment, both at the generating station and grid sub-station, operated satisfactorily, but the fault that caused the breakdown was outside the zone of protection. Switchboard sectionalisation was in accordance with the best practice at the time of its installation, and flash barriers put in at the suggestion of the Central Electricity Board's engineers prevented the fire from spreading.

Sealing of the cables where they passed through the floor did not prevent the fire spreading in the basement, where it did much more serious damage. It is most probable that burning oil and bitumen destroyed the lead covering and insulation of some of the cables down through the seals, or that burning cables slipped down below their seals.

The fire was spread below the switchroom by means of the oil-impregnated paper insulation of the cables in the basement. Had the floor seals been effective the total damage would have been comparatively small. The switchgear makers were not responsible for the arrangement of the connecting cables. Sectionalisation of main and multi-core control cables has not received much attention for the reason that "no one ever contemplated a disaster of this kind," says the report.

Only eight switches were seriously damaged; had the fire been confined to them and not destroyed long lengths of main cables and multi-core control cables to the whole forty-seven main and sixteen auxiliary switches, approximately 70 per cent. of the total supplies would have been available the next day and a full supply three days later. As it was about 15 per cent. was restored on the following day, and complete restoration was not effected until the seventh day.

While the fire-fighting appliances in the station were effective in extinguishing the initial fault fire, they were useless afterwards because it was not possible to get at the seat of the subsequent fire owing to dense smoke. This breakdown, says the report, though very serious, does not detract in any way from the high quality of the bakelite insulators used in the switchgear. While it was known before the accident that the insulation resistance of certain c.t. orifice insulators was relatively low, no immediate danger was anticipated and their replacement was actually in hand at the time of breakdown.

In the circumstances no blame can be attached to any Corporation officials, and the manner in which supply was restored reflects great credit on the staff.

New Apparatus and Devices

for Domestic, Cooking and Heating, Lighting, Power and Scientific Purposes

Cinema Rectifiers

For supplying power to operate cinematograph projector and spotlight arcs, &c., the WESTINGHOUSE BRAKE & SIGNAL CO., LTD., 82, York Road, King's Cross, London, N.1, has introduced a special range of rectifiers. This equipment is the result of several years' investigation into the particular requirements of such lamps, and dispenses entirely with the use of ballast or stabilising resistances, while permitting the equipment to operate at high efficiency and power-factor. In addition, it is claimed that special characteristics have been achieved which result in the arc operating under almost precisely constant current conditions irrespective of variations in the length of the arc gap. Standard sizes of apparatus have been prepared to meet the requirements of cinemas which have a 3-phase, 50-cycle supply.

The illustration shows the "Twin-30" model, rated at 30 A at 55 V.

A "Westinghouse" cinema rectifier

An Arc-engraver

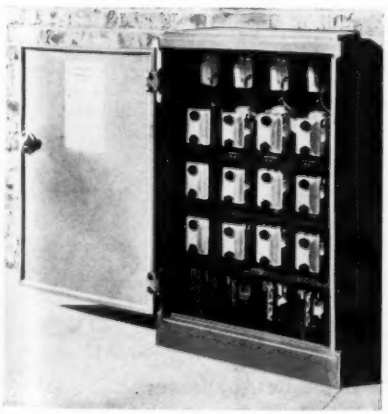
The "Barlograph" arc engraver is the latest product of MESSRS. REEVES, BARLOW, LTD., 4, Upper Marylebone Street, London, W.1. It will engrave on cast-steel, iron, brass or aluminium, and can be operated from a 6-V battery or, *via* a special transformer, from a.c. mains.

All-wave Ferranti Radio Receivers

The "all-wave" feature has now been applied by MESSRS. FERRANTI, LTD., Moston, Lancs, to their complete range of receivers, which comprises ten models ranging from the "Parva" to the "Gloria" autogram. All except the "Arcadia," which was first introduced two or three years ago, are relatively new models. The "Arcadia," an eight-stage superheterodyne receiver, while maintaining its 2½-W super-power output to give good quality, now incorporates such refinements as a noise suppressor, variable selectivity, and a "magnascopic" dial giving readings equivalent to a scale more than 6 ft. long and thereby simplifying tuning on the short waves. The wavelength range of all models is 19-51 m., 200-590 m., and 900-2,000 m.

Dwarf Overground Disconnecting Boxes

The "Henley" dwarf-type overground disconnecting box is designed to be accessible and yet unobtrusive. Its maximum height is 3 ft. 6 in. and its depth from back to front is 9 in. As all jointing can be carried out from the front, it can be installed actually in or against walls. The adaptability of the underground box is preserved in the dwarf overground design, but whereas the standard underground box has only four ways, there is a range of dwarf types which is designed for the accommodation of as many as eight cables in one box.



A "Henley" dwarf disconnecting box

Units are standardised for low-voltage twin-, three-, four- and five-core p.i.l.c. and armoured cables, and for working currents up to 200 and 300 A. The porcelain insulators supporting the conductor fittings are mounted on the ⅜-in. square steel bar forming the backbone of the unit, which is rust-proofed by the parkerising process and further protected by bituminous paint. Electrical contact with the tags of the cartridge fuses is effected by means of a clamping device.

Tinned copper bus-bars (of one standard sectional area with studs for connection to the lower fuse contact fittings of the units) are mounted at the back of the units, and the studs are riveted permanently at standard lateral centres to accommodate either 200- or 300-A units.

A 30-A or 60-A high-rupturing capacity cartridge fuse is mounted at the top of the unit for use where five-core cable embodies a small (fifth) conductor to cater for street lighting or similar load, which must be separately controlled. This fuse is fitted in an "ISCO" porcelain handle and base, and a separate fifth bus-bar connects up the individual fuses.

A cast-iron sealing box for the incoming paper-insulated cable is fixed independently of the unit on a wrought-iron strap, and single-core tails proceed from the grip-type jointing sleeves inside the sealing box to the conductor fittings to which they are sweated. The cable cores can be taken straight through the sealing box and connected to the conductor fittings if desired. The plinth and the angle-iron tie at the base of the root are removable, and the conductor fittings enable the connections to be taken from the sealing box without disturbing the natural lay of the cable cores.

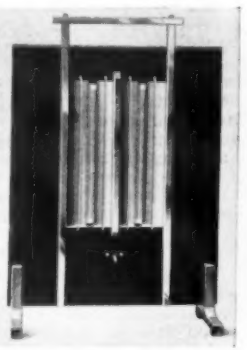
The manufacturers are MESSRS. W. T. HENLEY'S TELEGRAPH WORKS CO., LTD., Holborn Viaduct, London, E.C.1.

"Electroway" Fires

Illustrated is a new type of screen reflector fire (92R) made by ELECTROWAY HEATERS, LTD., Sparrow Hill, Loughborough. Tubular bars which can be loaded at 1 or 1½ kW are incorporated and the reflector and front are of chromium-plated brass. Control is by means of a 15-A foot-operated switch.

Another newcomer is the "WR1," a wall fire made of steel with a stove enamel finish; a similar fire for corners is the "CR" type. Both are available with one- or two-bar elements.

Model "NG" is a "wall-set" of special design, the front being of chromium-plated hard rolled brass and the surround of steel, the whole being fitted into a polished oak or walnut frame. Although not standard, reflector elements can be incorporated.



The "Electroway" 92R screen reflector fire

A Refractory Firebar

The latest introduction by MESSRS. C. W. OUTRAM & CO., LTD., Woodville, Burton-on-Trent, is a refractory firebar.

It is 10¼ in. long and 3¼ in. wide and has a heating surface 9 in. long. There are five grooves extending lengthwise for housing the element, and there are seven vertical reinforcements. The bar has a flat face but about two inches at each end are turned back to give a curved radiating surface, so that the heat from the fire is distributed uniformly in front. It is low in price and is designed for easy wiring and fitting.

Bakelised Bearings

Fabric bearings, bonded with varnish, are said to be superior to metal for heavy rolling-mill service, inasmuch as they effect a saving in power and have a longer life. Bearing sections of this type are manufactured by the METROPOLITAN-VICKERS ELECTRICAL CO., LTD., Trafford Park, Manchester, 17, of specially strong fabric treated with synthetic resin and moulded by a time, heat and pressure process, usually to correct shape without needing subsequent machining.

Typical component parts of a "Metrovick" bakelised bearing

A feed-water pipe mounted alongside the bearing is provided with two slots so placed as to direct the water in two jets, one into the bearing for lubricating and cooling the surface of contact. The other jet impinges upon the journal surface,

against the direction of rotation, as it approaches the bearing, and serves to cool the shaft and to wash it.

The film of water lubricant is most easily maintained at high speed and light loads, while grease lubricant is needed for starting and for rubbing speeds up to about 200 ft. p.m. The general method is to apply grease to the neck as the mill is coming to rest. This treatment prevents the formation of rust on the roll neck while standing. For loads above 1,500 lb. per sq. in. grease must be used at all speeds, as well as the water for cooling, and for loads over 4,000 lb. per sq. in. a special cooling medium may have to be used (suds).

A Strip Lighting Lampholder

A special design of strip-lighting lampholder has been produced by MESSRS. WARD & GOLDSTONE, LTD., Frederick Road, Pendleton, Manchester 6. It is made of bakelite, with a metal back plate, which is available with fixing lugs if required, cadmium-plated to withstand the severe atmospheric conditions prevailing near the coast. The pins are placed so as to take standard 7/029 c.t.s. cable or the special "Goltone" equivalent, 45/012, which is designed to give the maximum flexibility, so that the cable can be wrapped round trees and columns and adapted to outlining figures in light. For this reason the fitting should prove of use for autumn illumination and for special displays in connection with the Coronation next year.

The "Goltone" strip-lighting lampholder

Improved Ceiling Fans

THE GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, London, W.C.2, has introduced several new and improved ceiling fans. For instance, the "Swan" fan—a 60-in. sweep type for d.c. circuits—has been made more efficient and lighter. The four-pole series motor is fitted with a ball thrust bearing and one long bronze sleeve bearing. The "Everest" and "Kingsway Junior" fans for a.c. circuits (with sweeps of 58 and 44 in. respectively) have a better starting torque and regulation. The motors are now provided with greased-packed ball bearings and the terminals are protected. Heavy gauge (14 s.w.g.) aluminium sheet blades are fitted and are scientifically curved. Suitable speed regulators can be provided.

Scientifically Designed Lighting Fittings

Though they have already been installed at a number of large stores and offices, the Zeiss stepped reflector lamps have hitherto been supplied only direct from the manufacturers, MESSRS. ZEISS IKON, LTD., 37-41, Mortimer Street, London, W.1, who now announce that supplies are available to the electrical trade. The design of the reflector is such that the main portion of the light is thrown downward and only a small portion upward to illuminate the ceiling.

Pure silver only is used for the silvering process and this is protected on the inside by the glass and on the back first with copper and finally by a coat of aluminium lacquer.

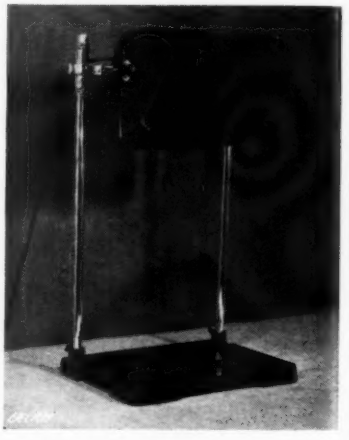
In spite of their being designed primarily to give the greatest illumination for the least energy, the fittings are quite attractive in appearance and are particularly suitable for the general lighting of shops, showrooms, offices, art galleries, halls, &c., models being available to suit any size or shape of room. The illumination is stated to be free from glare.

The Zeiss stepped reflector lamp, and the "J.Pr.1" trough reflector lamp

Another Zeiss development is the production of the new "J.Pr.1" trough reflector lamp, which by means of a specially designed reflector provides remarkably uniform illumination, the light being thrown evenly on to the whole surface of the ceiling without dark patches. The unit may be used either with pearl or clear lamps of from 40 to 100 W, the largest size being used in conjunction with a lightly frosted cover glass. The fittings are very suitable for use in hotels, cafés, dance halls, cinemas, salerooms, &c.

Testing by Fluorescence

Some substances will absorb ultra-violet rays and re-emit them as visible light, minute differences in the chemical composition often causing large variations in the colour of the emitted light. This fluorescence is used as a qualitative test, and the Hanovia-Muir analytic lamp has been designed for the purpose by HANOVIA, LTD., Bath Road, Cippenham, Slough.


The "Hanovia-Muir" analytic lamp

The source of radiation is a high-pressure electronic discharge tube known as the "S.500." The complete mercury arc spectrum is generated in a tube of pure fused quartz between two activated metal electrodes. The arc tube is self-starting and operates in any position; it is light and robust and has, it is claimed, an operating life of at least 1,000 hours. Its stability under varying temperature conditions enables it to be used effectively in a closed chamber.

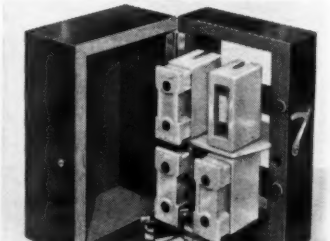
For the filter in the analytic lamp a special dark glass is used which absorbs all visible rays and transmits freely those around 3,660 A°. The total area of 7¼ in. by 5¾ in. is made up of four strips to obviate breakage due to its absorption. Considerable diffusion takes place, and an area of 5 ft. by 2½ ft. can be covered at a distance of 2 ft. from the filter.

The hood, which is a cylindrical metal casing trunnion mounted in a forked bracket, travels vertically by two sleeves along the double uprights. Locking screws are provided to secure it at any required angle or height up to 24 in. clear of the base. The inside of the hood is blackened to absorb aberrant rays, and ventilating louvres are fitted.

Control is by a castor-fitted floor unit containing the starting rheostat and main circuits for the arc tube.

An Improved Fuseboard

No screws are used for securing the fuse wire in a 5-A, 250-V, d.p., Home Office type fuseboard produced by the AGRO ELECTRICAL CO., LTD., and marketed by T.C.M.-Harwell, (Sales), Ltd., 233, Shaftesbury Avenue, London, W.C.2. Instead special spring clips hold it firmly in position. To facilitate wiring the porcelain fuse-holder bases are mounted on battens that are quite easily detachable from the wooden housing.


The "Agro" 5-A fuseboard

Small Domestic Appliances

A coffee percolator, an egg saucepan and a milk saucepan are the latest products of the GRAFTON HEATER CO., 9/12, Jay's Buildings, Wynford Road, London, N.1.

The coffee percolator has a capacity of two pints with a loading of 500 W and is supplied with two yards of flex and a b.c. adaptor. It is spun from heavy aluminium and highly polished. The same remarks apply to the "Egg Tima," as it is called, and the milk saucepans. In addition the company has recently introduced a desk type fan with 8-in. blades. The base and motor housing comprise a casting finished in black or green enamel, four rubber feet being provided to enable the fan to be stood on polished surfaces without scratching them. The motor is rated at 25 W and a switch is fitted in the base.

Electrical Imports of China

BELOW are given the values of the imports of electrical material into China last year, with a note of the increase or decrease compared with 1934. (The Chinese gold unit equals about 1s. 8d.) It will be noticed that although the trade in power plant fell in value by about one-half, imports from the United Kingdom actually increased, while under the heading of "electrical machinery not otherwise enumerated" there was a rise by 446,000 G.U. in value to 1,195,000 G.U., with Germany appearing as the chief participant in the increase.

Last year saw a continuance of the fall in the imports of accumulators and dry cells, the total value of which now stands at less than a fifth of the 1933 level. This decline suggests the influence of the growth of local manufacture of batteries. Lamp imports seem also to be affected by local production.

It is difficult to forecast what the future holds for the electrical trade in China. Given settled conditions there are great potentialities, as the planned development of many parts of the country is being taken seriously in hand. But time after time hopes of peaceful progress are disappointed. Last year internal strife was less marked, and the control of the Central Government seemed to be growing firmer and more extensive. Another recent helpful factor was the successful introduction of currency reform, which in some degree began to offset the disturbance in the silver market. But since then political relations with Japan have become more strained, and smuggling in North China has had a very bad effect on both import trade and Customs revenues.

Perhaps one of the more promising lines of trade is telephone material. Projects recently reported include, in the province of Szechuan, a wireless transmitting station near Chengtu, overland telephone connections from that town to Chungking (about 300 miles) and to Omeihsien (about 150 miles) and from Chungking to Kweiyang. The latest issue of the *Chinese Economic Journal* also has numerous references to telegraphic, telephonic and radio developments.

	1935. Gold Units (000).	Inc. or dec. on 1934. Gold Units (000).
Dynamos and generators—		
Total	430	− 310
From Germany	76	− 179
„ United Kingdom	230	+ 24
„ United States	42	− 58
Electric motors and parts—		
Total	1,086	+ 6
From Belgium	50	− 2
„ Germany	335	+ 29
„ United Kingdom	150	− 107
„ Japan	225	+ 80
„ Sweden	130	+ 1
„ United States	93	− 46
Transformers—		
Total	462	+ 100
From Germany	130	+ 52
„ United Kingdom	116	− 17
„ Japan	98	+ 47
„ United States	42	+ 2
Electrical machinery, n.o.e.—		
Total	1,195	+ 446
From Germany	577	+ 432
„ United Kingdom	361	+ 24
„ France	9	− 37
„ Japan	101	+ 56
„ United States	108	− 13
Electric cables—		
Total	950	− 254
From Germany	250	+ 45
„ United Kingdom	439	− 379
„ Japan	205	+ 31
Insulated wire—		
Total	1,374	+ 207
From Germany	367	+ 133
„ United Kingdom	57	− 18
„ Japan	814	+ 158
„ United States	72	− 41

	1935. Gold Units (000).	Inc. or dec. on 1934. Gold Units (000).
Insulators, fuse-boxes, plugs, switchboards, etc.—		
Total	427	+ 19
From Great Britain	153	+ 130
„ Japan	159	+ 29
Switches—		
Total	69	− 1
From Great Britain	15	+ 5
„ Japan	19	− 4
Electric condensers and parts—		
Total	33	− 2
From United States	22	+ 12
Other electrical fittings and materials, n.o.e.—		
Total	706	+ 242
From Germany	92	+ 12
„ United Kingdom	236	+ 134
„ Japan	177	+ 53
„ United States	176	+ 33
Electric lamps and lampware—		
Total	141	− 200
From Germany	34	− 27
„ United Kingdom	17	− 89
„ United States	35	− 61
„ Japan	35	+ 3
Electric fans and accessories—		
Total	102	+ 14
From United Kingdom	23	+ 5
„ United States	30	− 14
„ Japan	34	+ 16
Flashlights and torch cases—		
Total	46	+ 9
From Hong Kong	22	+ 13
„ United States	18	− 6
„ Japan	5	+ 3

	1935. Gold Units (000).	Inc. or dec. on 1934. Gold Units (000).
Radio sets and parts—		
Total	2,196	− 132
From Germany	170	+ 15
„ United Kingdom	246	− 62
„ Japan	405	+ 155
„ Holland	31	− 37
„ United States	980	− 526
Other telephone and telegraph instruments and materials—		
Total	1,478	+ 387
From Belgium	372	+ 28
„ Germany	320	− 30
„ United Kingdom	97	− 139
„ United States	344	+ 210
Electric lamps—		
Total	150	− 10
From Germany	13	+ 11
„ Japan	49	—
„ Holland	6	—
„ United States	11	− 2
Accumulators and dry cells—		
Total	510	− 288
From Germany	35	+ 6
„ United Kingdom	62	− 10
„ Hong Kong	32	+ 4
„ Japan	33	+ 6
„ United States	313	− 303
Electric meters and parts—		
Total	867	+ 119
From Germany	503	+ 153
„ Switzerland	89	—
„ United Kingdom	48	− 24
„ United States	123	+ 31
Elec. appliances, n.o.s.—		
Total	514	+ 31
From Germany	31	− 16
„ United Kingdom	18	− 5
„ Japan	34	+ 5
„ United States	433	+ 45

New Books

Phenomena in High-Frequency Systems. By AUGUST HUND. Pp. 642; figs. 359. London: McGraw-Hill Publishing Co., Ltd. Price 36s.

This book is one of the "International Series in Physics," and may be regarded as complementary to the author's previous work, "High-Frequency Measurements." In a matter of thirteen chapters it deals, broadly speaking, with high frequency phenomena in discharge tubes and generators; voltage, current, phase and frequency changers; rectification and amplifiers; theories of electrostriction and of the ionised layer; electromagnetic theory; phenomena in lines which electrically are long and short; directive aerial systems; and the theory of recurrent networks. In many instances brief reviews of classical experience and theory precede the subsequent textual treatment.

The book is largely mathematical in character and is illustrated profusely with circuit diagrams, graphs and characteristic curves which will undoubtedly serve to lengthen the period after which it might be regarded as "dated." The work is of such a finely detailed and exhaustive nature that it is hardly possible to do more than pay general tribute to its merits. As a modern exposition of experimental and theoretical research on the subject, it is one of the best which has appeared.

While it is addressed principally to radio and communication engineers, the book contains a great deal of information of prime interest and importance to the power engineer and it should enjoy a wide circulation among all those interested in electrical science.

Radio Interference and Its Suppression. By J. H. REYNER. Pp. 130; figs. 55. London: Chapman & Hall, Ltd. Price 9s. 6d. net.

The subject of this book is of great interest to a large number of broadcast listeners as well as to technicians in broadcast reception, and is written in such a way as to make it useful to both parties, the author being careful to assume in the reader little electrical or mathematical background, and at the same time to give the information in a form which will appeal to the expert.

The volume deals mainly with the methods of eliminating interference from industrial plant or domestic equipment, and devotes a few pages to the principles of dealing with atmospherics and interference from wireless transmitting stations. The type of interference received from radiation from the mains is, of course, the chief theme. The two methods of combating this interference are fully described i.e., suppression at the source and protection of the receiving aerial, the latter being effective also against direct radiation and re-radiated interference.

It would seem probable that before long, in some countries anyway, it will be compulsory to fit suppression equipment to new machinery, and the author is optimistic enough to look forward to the time when, with a combination of suppressing equipment at the listener's premises, and the fitting of apparatus on industrial plant, radio reception for 90 per cent. of the population will be free from interference. The book describes well how interference arises and how its various forms can be located and eliminated, both for medium and short wave reception. The information given is up to date, and the text is so lucid that the book should be welcomed by the layman as well as by the expert.

Water Heating by Electricity. By J. RUSSELL HICKMOTT. Pp. 63; figs. and illus. London: Percival Marshall & Co., Ltd. Price: 1s. 6d.

This book is a handy work of reference written in terms which are readily understandable by the layman. The author begins by outlining the fundamentals of an ordinary domestic hot-water system, how the water circulates, and how the hot water finally arrives at the taps. With this preliminary information the reader is introduced to the various types of water heater now available, with diagrams of pipe connections which show clearly the standard arrangement of the piping. Some readers may be confused by the choice of terms for describing different types of water-heaters, as these are not those generally used in the industry.

The chapter on immersion heaters and circulators is of much interest. The author very rightly points out the necessity for giving much thought to the installation of these appliances and draws attention to the important question of pipe

losses. He omits, however, to distinguish between draw-offs used frequently and otherwise.

Some common faults which are to be found and the way in which they can be overcome are dealt with in chapter five, and a warning is given at the end regarding the futility of allowing a fault to continue in the hope that it will not affect the performance of the installation when electricity is used.

The intricacies of combined heating and hot-water systems are discussed in another chapter, with examples of how to adapt them to electrical heating or otherwise. Conversions are not very favourably regarded, and this is, perhaps, a good policy as it is impossible to lay down hard and fast rules covering this type of installation. The last three chapters deal with simple calculations, water-heating selling points, and the laws of heat.

One feels, however, that the author, from his experience, could say much more on the subject of running costs. We can, however, recommend this book to all who desire to be initiated into this branch of domestic electrification, and especially to supply undertakings' salesmen.

Shorter Notices

"Advanced Laboratory Practice in Electricity and Magnetism," by E. M. Terry. Revised by H. B. Wahlin. (Third edition.) Pp. 318; figs. 175. London: McGraw-Hill Publishing Co., Ltd. Price 18s.

"Cathode Ray Oscillography," by J. T. MacGregor-Morris and J. A. Henley. Pp. 249; figs. 151. Price 21s. net. "Short Wave Wireless Communication," by A. W. Ladner and C. R. Stoner. (Third edition). Pp. 453, figs. 248. Price 21s. net. London: Chapman & Hall, Ltd.

"An Outline of Steel and Iron," by A. Allison. Pp. 191; figs. 21 London: H. F. and G. Witherby, Ltd. Price 6s. net.

"Tables of Physical and Chemical Constants and Some Mathematical Functions," by G. W. C. Kaye and T. H. Laby. (Eighth edition.) Pp. 162. London: Longmans, Green & Co., Ltd. Price 14s. net.

"The New Light," by O. C. J. G. L. Overbeck. Pp. 229. London: Metchim & Son, Ltd. Price 5s.

"The Electrical Handicraftsman and Experimenter's Manual," by H. R. Langman and J. H. Moore. Pp. 192; figs. London: The Technical Press, Ltd. Price 7s. 6d. net.

"Electrical Engineering Materials, Tables and Properties," by F. G. Sublet. Pp. 147. London: Oxford University Press. Price 10s. 6d. net.

"Modern Radio Communication" (Volume 2), by J. H. Reyner. (Second edition). Pp. 220; figs. 137. Price 7s. 6d. net. "Steam Turbine Operation," by W. J. Kearton. (Second edition). Pp. 346; figs. 202. Price 12s. 6d. net. London: Sir Isaac Pitman & Sons, Ltd.

"The Hydro-electric Practice in India," by B. C. Chatterjee. (Two volumes.) India: S. N. Chatterjee, 1, Lahsha Road, Benares City.

In the Courts

MR. JUSTICE LUXMOORE, in the Chancery Division on June 24th, after a hearing lasting twenty-three days, reserved his judgment in the action brought by Electric and Musical Industries, Ltd., and the Boonton Research Corporation (of New Jersey, U.S.A.), against Lissen, Ltd., and G. Kalis (trading as Andy's Radio Supplies), for an injunction to restrain the alleged infringement of letters patent No. 376737 granted to the Boonton Corporation on March 19th, 1930, for "Improvements in electrical wave amplifying apparatus" and in 1934 assigned by the Corporation to the first plaintiffs, who were now the registered legal owners of the patent. The plaintiffs also claimed damages.

The reason why the Boonton Corporation were joined as plaintiffs was that if the action succeeded and damages were granted they might go back prior to the date of the assignment of the patent.

The defence was that the alleged invention was not novel by reason of prior user and that the patent was invalid because of insufficiency of description and ambiguity in the specification with regard to the monopoly claimed. The defendants further alleged that a certain statement in the specification was a false representation. The defendants also counterclaimed for revocation of the plaintiffs' patent.

The "Fenbo" Lamp Litigation

In the Court of Appeal on June 24th the hearing was continued before Lords Justices Greer, Greene and Scott, of the appeal by the British Crystal Lamp Co. from the judgment of the Official Referee, Mr. C. M. Pitman, K.C., in favour of the Northern Electrical Distributors Co. (of Hull) and Mr. J. B. Breed (who traded under the name of the latter company) on the counterclaims raised by both parties.

(The proceedings before the Official Referee were reported in the ELECTRICAL REVIEW of December 27th, 1935, and those in the Court of Appeal on June 19th).

The litigation arose out of an agreement made between the parties in June, 1933, under which Mr. Breed's company was appointed sole distributors for the sale of "Fenbo" electric lamps in Hull and district for a certain defined period. In pursuance of that agreement Mr. Breed claimed that he had built up a large connection of customers for the lamps; but in consequence of his having been supplied with large quantities of lamps which were defectively constructed his distributing business had failed altogether. He accordingly counterclaimed for £400 damages. The British Crystal Lamp Co. denied liability for what had occurred alleging that they were merely the agents for the sale of "Fenbo" lamps in the United Kingdom and that neither Mr. Breed nor his company had relied on their skill and judgment in the matter.

The other counterclaim was by the British Crystal Lamp Co. to recover £298 against Mr. Breed or his company on the ground that they had not purchased the proper number of lamps under the agreement.

After a hearing extending over several days the Official Referee gave judgment for Mr. Breed for £250 damages and costs on his counterclaim and also for him on the counterclaim of the British Crystal Lamp Co., who now appealed.

Mr. W. A. L. Raeburn having concluded his address for the appellant company, Mr. C. W. Salter supported the judgment of the Official Referee on behalf of the respondents. He said that Mr. Breed was not likely to get a penny under the judgment he had obtained. When he tried to levy execution he found that a receiver of the lamp company had been appointed and then he presented a petition for winding up the company. He found that the paid-up capital of the company was £100; that there was a debenture for £5,000; and that the total amount owing to creditors was £12,570, so that there was not enough even to pay the first debenture-holder.

At the conclusion of the arguments, Lord Justice Greer having dealt at length with the evidence given before the Official Referee said he thought the decision the Referee had come to was amply justified and that the appeal failed and should be dismissed with costs. The other members of the Court concurred.

Mullard v. Philco

The House of Lords, consisting of Lords Blanesburgh, MacMillan, Alness and Roche, on June 30th, dismissed with costs the appeal of the Mullard Radio Valve Co., Ltd., from the judgment of the Court of Appeal affirming the judgment of Mr. Justice Farwell in the Chancery Division dismissing the action which the company brought against Philco Radio & Television Corporation of Great Britain, Ltd., George Robinson & Son, Ltd., and London Piano & Radio, Ltd., for an injunction (and the usual ancillary relief) to restrain the alleged infringement by the defendants of the appellants' letters patent No. 287958 dated December 24th, 1926, relating to circuit arrangements and discharge tubes for amplifying electric oscillations.

Parliamentary News (BY OUR SPECIAL REPORTER)

THE Select Committee of the House of Commons on Unopposed Bills had before it on June 25th the North Metropolitan Electric Power Supply Co.'s Bill. Capt. R. C. Bourne (Oxford, U.) presided. By this Bill the company seeks power to increase its capital from £5,000,000 to £8,000,000, and also seeks new borrowing powers to the amount of £1,500,000. It is also proposed that any part of the unissued capital of the company may be raised in the form of first preference stock ranking *pari passu* with the existing 6 per cent. preference shares.

There is a clause in the Bill empowering the London Passenger Transport Board to sell or lease to the company the Neasden generating station. The Committee found the preamble proved, and the Bill was ordered to be reported for third reading.

Colne and Northwood Electricity Bill

The Colne Valley and Northwood Electricity Bill was considered on June 25th by the House of Lords Committee on Unopposed Bills, Lord Onslow presiding. By this Bill provision is made for the purchase by the London and Home Counties Joint Electricity Authority of the undertakings of the Colne Valley Electric Supply Co., Ltd., and the Northwood Electric Supply Co., Ltd. The Committee approved the Bill and it was ordered to be reported for third reading.

Electricity in War Time

On June 25th Mr. Errington asked the Minister for the Co-ordination of Defence what steps were being taken to ensure alternative supplies of electricity in the event of the destruction of supply lines and power stations by hostile action. Sir T. Inskip replied that the existing system, which was every day being perfected, provided an alternative supply in any given area which should be available in the event of the destruction of a supply line or power station by hostile action. The maintenance of a supply under air raid conditions was certainly a matter which required, and was receiving, careful attention at present.

Business and Industrial Notes

The Week's News. Showrooms and Exhibitions. New Installations. Overseas Trade. Publicity Material. Trade Announcements. Prices of Materials. Liquidations and Bankruptcies.

Electricians' Hours

The Employers' Representatives of the National Joint Industrial Council and the National Joint Board for the Electricity Supply Industry have reported to the Minister of Transport that they cannot recommend a reduction of hours in the electricity supply industry, adding that they think it is beyond dispute that the staff and employés in the industry enjoy salaries, wages and working conditions which are more favourable than in other industries. Questionnaires completed by thirty-six of the largest undertakings in the areas of the thirteen District Councils operating in conjunction with the National Council indicate that if a 40-hour week were adopted the total number of men on both the technical and manual staffs (57,000) would have to be increased by 8,949 (15.7 per cent.), involving increased salary and wage costs of £603,610 (16.12 per cent.) per annum. On this basis the total increase in salary and wage costs for the whole industry would be £1,530,839 per annum. A similar inquiry into the effects of a 42-hour week shows that the number of additional employés required would be 6,965 (12.22 per cent. increase) and the salary and wages increase £1,167,900 (12.75 per cent.). Not taking into account the effect of capital charges, the increased cost per kWh sold would be 0.0258d. in the case of a 40-hour week and 0.0196d. for a 42-hour week. Assuming that a reduction of hours accompanied by a *pro rata* reduction of wages is impracticable, the resulting disparity of the wages with those in other industries would result, it is thought, in the majority of undertakings ceasing as far as possible to carry out work by direct labour and in their letting it out to contract. This would diminish the number of permanent employés and increase the number of men engaged intermittently by private enterprise. An increase in electricity charges would seriously prejudice future development.

An Electrical Exhibition Train

A few hours before the start for its maiden trip from Prescot on Wednesday last week we inspected what is believed to be the first electrical show train to be established in this country. It is the latest venture of British Insulated Cables, Ltd., the principal aim being to serve those towns which normally do not enjoy showroom facilities. Once inside we were surprised at the spaciousness of the showroom, which comprises two full-sized coaches attractively painted outside and pleasantly decorated inside. One is devoted wholly to the exhibition of the lighter of the company's wares—such as meters, cut-outs and overhead-line fittings—on two sloping display tables surmounted by showcases and panels. Two portions of the second coach serve as living quarters for the resident show-train manager and as the "generating station" respectively. The remainder of this coach is devoted to the display of heavier products, such as terminal and joint boxes on the floor and walls. The generating plant consists of a Lister house-lighting set, and a battery, with automatic change-over equipment

The resident train manager will work in conjunction with the company's branch managers as and when the train is in the various districts, and he will draw on the personnel of the districts for specialised assistance. Travelling programmes will be prearranged in collaboration with the railway authorities, and generally station platform accommodation will be provided during the exhibition halts. Previously issued invitation cards will ensure the necessary platform entry. The first programme, extending from June 24th to August 25th, provides for exhibitions at twenty-seven towns in Lancashire and Yorkshire, including Wigan, Southport, Preston, Blackpool, Burnley, Bradford, York, Barnsley, Huddersfield, Rochdale, Stockport and Widnes.

International Glass Congress

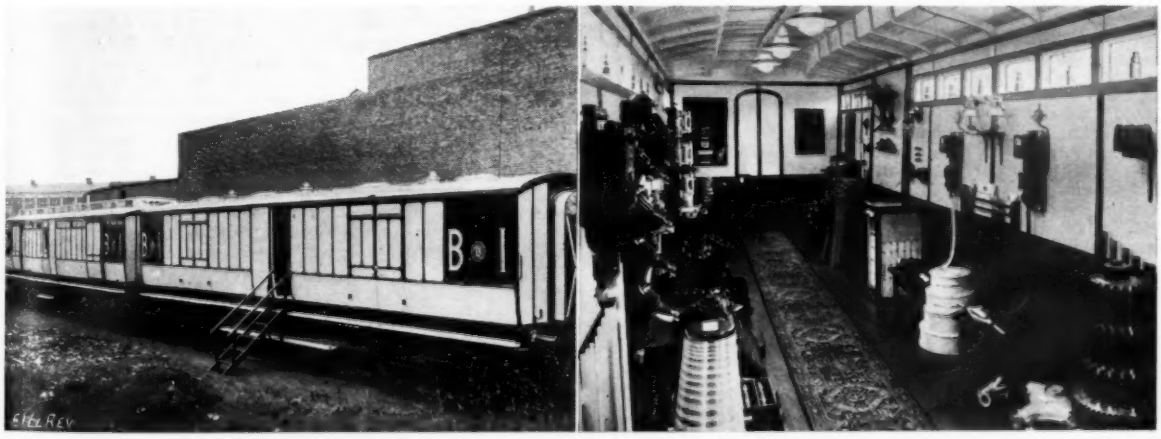
The Duke of Kent was to open the International Congress on Glass yesterday (Thursday), at the Institution of Electrical Engineeers, Savoy Place, W.C. The Congress, which is in session from July 2nd to 11th, partly in London and partly in Sheffield, is studying all aspects of glass, that is, scientific, technical, decorative, and cultural, although it will not deal with commercial or economic problems. The president of the Congress is Mr. B. P. Dudding, M.B.E., and there are six honorary presidents, the heads of the official foreign delegations. About twenty countries are participating, and the overseas delegates number about 150. There is to be a dinner and dance given to the Congress by the Glass Manufacturers' Federation at the Trocadero Restaurant, this evening (Friday), the official luncheon will be held in Sheffield on July 6th, and the Congress banquet and ball will be held at the Park Lane Hotel, on July 10th.

Control of Japanese Electricity Supply Industry

A *Reuter* message from Tokio states that the Minister of Communications has approved a plan for the State control of the electric power industry through an electric generation and transmission company which is to be organised as soon as possible. This new State company will have a capital of 2,000,000,000 yen (£115,000,000 approximately) and will take over control in 1938. The new National Company will take over all the existing electric power companies. Its capital will be provided by the existing companies and it is estimated that the cost of electric power will be lowered by 20 per cent. through its operations.

Trade Commissioner's Visit

The Department of Overseas Trade announces that Mr. R. B. Willmot, H.M. Trade Commissioner at Singapore, is at present in the United Kingdom on an official visit. Mr. Willmot will be available at the Department of Overseas Trade on July 6th, 7th and 8th for the purpose of interviewing manufacturers and merchants interested in the export of United Kingdom goods to British Malaya (covering the Straits Settlements, Federated Malay States, and the Unfederated Malay States), North Borneo, Sarawak and Brunei, after which he will commence a tour of a few of the more important centres in the provinces. Firms who desire an interview with Mr. Willmot or information regarding his arrangements to visit the provinces, should apply to the Department, at 35, Old Queen Street, S.W.1, quoting the reference number 22530/36.



The B.I. electrical show train. The right-hand picture shows the interior of the heavier-equipment coach

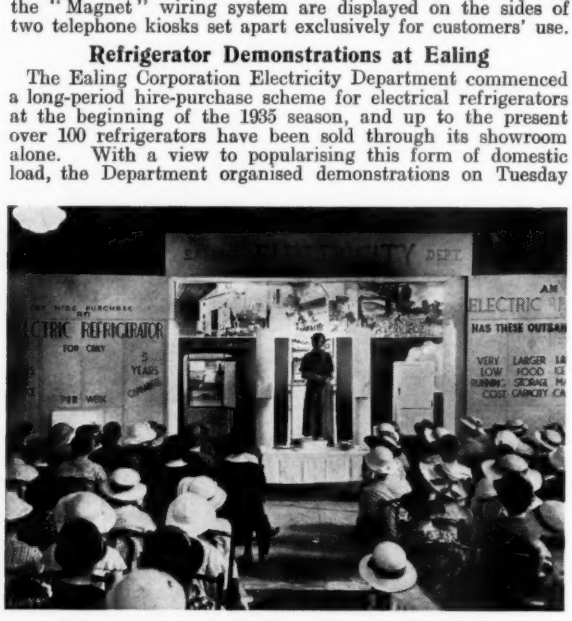
An Exhibition of Electrical Installation Material

A permanent exhibition of installation material and other products of the company has been arranged by the General Electric Co., Ltd., at Magnet House, Kingsway, W.C. The space allotted to this exhibition is on either side of the main entrance to the counters on the ground floor of Magnet House. Four rectangular island stands, flanked by a series of wall recesses, have been built to form the base-work of the exhibition. The stands are allocated to ironclad switchgear and measuring instruments; installation accessories; fans and small

motors; and household electrical appliances and fires. The wall recesses, a dozen in all, are assigned to such other sections of goods marketed by the G.E.C. as batteries and torches; fittings accessories; bells and accessories; signalling apparatus and telephones; lamps; installation accessories; domestic switchgear; conduit and conduit accessories; electric clocks, &c. Spaced at intervals beneath the wall recesses are types of inset and wall-mounting electric fires, while "Osram" architectural lamps and the various fittings which go to make up the "Magnet" wiring system are displayed on the sides of two telephone kiosks set apart exclusively for customers' use.

Refrigerator Demonstrations at Ealing

The Ealing Corporation Electricity Department commenced a long-period hire-purchase scheme for electrical refrigerators at the beginning of the 1935 season, and up to the present over 100 refrigerators have been sold through its showroom alone. With a view to popularising this form of domestic load, the Department organised demonstrations on Tuesday



A refrigerator demonstration in progress at Ealing

and Wednesday last week at Ealing Town Hall. The Department first notified 5,000 consumers by means of a sales letter and two days later this was followed up with an official invitation card. The showroom window was specially changed to "tie up" with the demonstrations. A lecture lasting about forty-five minutes was given and there was a display of the E.D.A. films and a gramophone recital at each session. A competition inviting the audience to place in order of popularity the various merits of electric refrigeration was very well supported. The total attendance at all four "performances" exceeded 500. As will be seen from the accompanying illustration, a special stage was erected and on the side pieces in red and black letters the main selling points were set out. Round the room working models could be examined and these were explained by salesmen. Business in the showroom has doubled largely as the result of the demonstration. The Ealing five-year refrigerator scheme is as follows:—H.M.V. model E.326, 3¼ cu. ft. capacity, 2s. 6d. per week; model E.426, 4¼ cu. ft. capacity, 3s. 3d. per week; model P.54, 5.4 cu. ft. capacity, 4s. per week; five years' free service and five years' guarantee. The 2s. 6d. per week model can be operated for 2d. a week on the domestic all-in tariff (3 kWh a penny).

Social Events

The General Electric Co., Ltd., had its usual good fortune in the matter of weather for its annual sports meeting which was held at its Wembley sports ground on Saturday last. A strong sun was tempered by a cooling breeze which made the afternoon pleasant for both the competitors and the large number of spectators who attended to witness the long list of events. The most coveted of the trophies is the Leslie Gamage trophy for the London establishment gaining the most points during the meeting, and the Head Office, the holders, claimed the distinction of retaining it for yet another year. A new feature was a display by the League of Health and Beauty (Osram ladies), under the direction of Miss Margo Hirshfield, who were worthy upholders of these feminine attributes and gained well-merited applause for their display. There was the same keenness as in previous years by the competitors of the various races for the many challenge cups and other prizes and they received enthusiastic encouragement from the onlookers. The side shows, always a popular feature, were well patronised, while the City of London (British Legion) Military Band gave a varied programme of light music during the afternoon. At the conclusion of the races Mrs. M. J. Railing distributed the prizes, and Mr. J. A. Phelp proposed a vote of thanks to her, to which Mr. M. J. Railing briefly replied. A successful day was concluded with dancing.

The tenth annual athletic sports of the Clesco Sports and Social Club (County of London Electric Supply Co. and associated companies) was held at the company's sports ground, Raynes Park, on Saturday last. There was a larger attendance than in previous years, and in very favourable weather some exciting events were witnessed. The Sir Harry Renwick challenge cup for the district gaining the largest number of points was won by City Road, while T. A. Brooks, of City Road, was the successful competitor for the Sir Bernard Greenwell challenge cup. Balham and Streatham were once again winners of the Vice-President's Challenge Trophy for the tug-of-war. A new event was an inter-companies' invitation relay race, which was won by the Clesco Club with the Kent Electric Power Co. a very good second. Mrs. Brand, wife of Mr. J. C. Brand, a director, presented the prizes, and afterwards Mr. Brand made a brief speech. A "variety hour" followed, and a pleasant day was brought to a close with dancing on the green.

The London and Home Counties J.E.A. Sports and Social Association held its annual sports at the Thames Ditton sports ground last Saturday. The efficient organisation of the event was due to the efforts of Mr. S. H. Harvey, the sports ground secretary, and his assistants. Further entertainment was provided in the evening by a display by the Kingston Boys' Brigade and dancing on the green. The prizes were distributed by County Alderman J. Chuter Ede, M.P., president of the Association, and chairman of the J.E.A., and by Mrs. Chuter Ede.

Nearly a hundred members of the staff of Messrs. S. Rogers & Co., Ltd., and their guests spent a happy day at Southsea on the occasion of the ninth annual outing held on June 13th.

The London staff of Messrs. Crompton Parkinson, Ltd., held their annual outing on June 27th, when about 150 members travelled by coaches to Rustington Lido, Littlehampton, where they spent the day. Bathing, dancing, tennis and cricket were indulged in and they returned to London late in the evening after a pleasant day.

Changes of Name

Electricair, Ltd., 26, Brazennose Street, Manchester, has changed its name to Electro-air, Ltd. Low Tension Systems, Ltd., Wellington Buildings, The Strand, Liverpool, will in future be known as Clock Rentals, Ltd

Electric Trains for New Zealand

The English Electric Co., Ltd., has received an order for six two-car motor coach electric trains for the New Zealand Government Railways. The coaches of the light, all-steel construction. Each train consists of a driving coach and a trailer coach, so designed that different sizes of trains can be made by coupling these units together. The system is 1,500 V d.c. These will be the first electric motor coach trains to be put into service on the New Zealand Railways, and are to be used on the suburban system running from Wellington to Johnsonville. In addition, they are the first all-steel coaches to be put into service in that country. Seating is provided for over 140 passengers, and the seats are of an up-to-date and luxurious type which will be fitted by the New Zealand Government Railways in their own workshops. The trains have been designed to maintain a high schedule speed which will be comparable with the most up-to-date similar suburban services. The order also includes the equipment for two high-speed modern passenger electric locomotives as an extension to the order placed with the company in December 23 last year for a number of similar locomotives. The value of the present order is approximately £100,000. The

Mr. and Mrs. M. J. Railing at the G.E.C. sports

Mrs. J. C. Brand presenting the prizes at the "Clesco" function

whole of the design and construction of the equipment covered by this order will be carried out within the company's organisation.

Trade Announcements

Elexcel, Ltd., has appointed Space Heating, Ltd., 37, 38, York Place, Leeds, space-heating consultants and special distributors for "Xcel" electric heating equipment. Technical service will now be available at all Elexcel branches, where comprehensive stocks of modern electric heating units will be maintained.

Mr. W. M. Clinch, who has resigned his seat on the board of the Massa Sparking Plug Co., Ltd., will shortly open an office in Lisbon as a manufacturers' representative. He wishes to receive communications and catalogues from manufacturers at 65, Durham Road, London, S.W.20.

Mr. L. Wilkinson has removed to "Electric House," 204, Lower Addiscombe Road, Croydon (telephone: Addiscombe 2027).

The London office of the United Steel Companies, Ltd., has been removed to 8 and 10, Grosvenor Gardens, Victoria, S.W.1 (telephone: Sloane 4833).

Messrs. Simpson, Baker & Co., Ltd., have opened a branch at 25, Catherine Street, Exeter (telephone No. 3221).

Irish Free State Electrical Imports

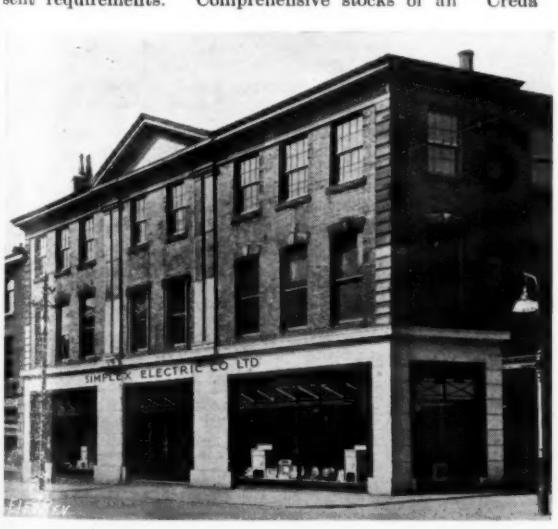
A somewhat quieter tone prevailed as regards the imports of electrical machinery and allied material in the Irish Free State during May last, the month's imports attaining a value of £68,660, as compared with £83,716 in the corresponding month of 1935. The aggregate imports during the first five months of the current year as compared with those a year ago are shown in the appended table.

	January–May. 1935.	1936.
	£	£
Electric motors	22,007	24,418
Other electrical machinery	90,713	85,441
Dry batteries and parts	10,142	6,503
Electric lamp bulbs	32,000	22,967
Electric lighting accessories	32,455	36,405
Electric wires and cables, insulated	38,802	34,057
Telegraph and telephone apparatus	2,605	4,645
Radio receivers, complete	22,306	19,677
Radio-gramophones, complete	1,556	646
Other radio apparatus, fully or partly assembled	2,098	3,490
Radio parts and accessories	25,940	30,042
Other electrical goods and apparatus	90,339	106,975
Totals	£370,963	£375,266

As will be seen, the imports of electrical machinery and five of the other items scheduled show a slight decline and six an advance, the result being an increase in the gross total of £4,303.

New Simplex Manchester Premises

The new showrooms of the Simplex Electric Co., Ltd., at 31-33, King Street West, Manchester, 3, were formally opened on June 15th. The company's old premises at 10, Marsden Street, Manchester, had become too small, and the new offices, showrooms and stores will adequately meet the company's present requirements. Comprehensive stocks of all "Creda" domestic appliances and Simplex installation equipment are carried. Mr. W. Foster, manager of the North-Western area, and Mr. W. C. Sherry, Manchester branch manager, together with a staff of sales engineers, are available to call upon customers in connection with electrical installation work and domestic appliances.



The new Manchester premises of the Simplex Electric Co., Ltd.

The French Electrical Industry

Addressing the shareholders at the annual meeting of the French electrical manufacturing company, Société Alsthom, the chairman (M. E. Mercier) stated that according to the Martignon agreements the general increases in wages and salaries were not to exceed an average of 12 per cent. But the new minimum wages in many cases had brought about an advance for the electrical industry of between 18 and 25 per cent. and between 10 and 15 per cent. in salaries. With the introduction of paid holidays, and the 40-hour week the total increase in the wages accounts amounted to between 40 and 50 per cent. An augmentation of 45 per cent. in the wages must lead to an increase of 30 to 35 per cent. in the sale prices of industrial products. Even if it were assumed that sale prices could gradually be adjusted to the new situation, all producing works would be confronted with a formidable financial problem. In various cases the advance in wages would render it impossible to continue to keep works in full activity, and in addition there would be a total loss of the export markets.

Works Visit

On June 18th about seventy members of the E.C.A. (Western Section) visited the main Rugby works of the British Thomson-Houston Co., Ltd. The visitors included Messrs. C. D. James (chairman), W. B. Williams (hon. treasurer), W. T. Porter (chairman, Bristol Branch), J. Newth (chairman, Gloucester and Cheltenham Branch), and R. A. Parsons (hon. secretary and treasurer). On arrival lunch was served, the visitors being welcomed by Mr. A. P. Young, manager of the works. A vote of thanks was proposed by Mr. James and seconded by Mr. Parsons.

For Sale

Liverpool Electric Supply Department has for sale second-hand generating plant.

(See our classified advertisements.)

An Income Tax Guide

Once more Messrs. Jordan & Sons, Ltd., 116, Chancery Lane, London, W.C.2, have sent us their "Income Tax Guide" (price 6d.). This takes account of all the alterations in the tax effected by this year's Finance Act and points to ways in which the taxpayer may avoid paying more than is strictly necessary.

Prices of Materials

The following prices are only general, and they may vary according to quantities and other circumstances:—

CHEMICALS, ETC.	Price. July 1st.	Fortnight's Inc. or Dec.
a Acid, Oxalic ... per cwt.	50s.	—
a Ammoniac, Sal ... per ton	£36	—
a Ammonia, Muriate (large crystal) ... „	£18 10s.	—
a Borax ... „	£17	—
a Copper, Sulphate ... „	£15 10s.	—
a Potash, Chlorate ... per lb.	3½d. to 4½d.	—
a „ Perchlorate ... „	6d.	—
a Shellac ... per cwt.	£4 18s.	—
a Sulphur Commercial ... per ton	£11	—
a „ Roll ... „	£11	—
a Soda Chlorate ... per lb.	3¼d. to 3½d.	—
a „ Crystals ... per ton	£5 to £5 5s.	—
a Sodium Bichromate, casks ... per lb.	4d. nett.	—
METALS, ETC.		
b Aluminium, Ingots ... per ton	£100 to £105	—
b „ Wire ... per lb.	1/1 to 1/9	—
b „ Sheet and Foil ... „	1/3 to 2/9	—
p Babbitts Metal and Anti-friction Metals—		
Grade I ... per ton net	£166	£8 dec.
Grade II ... „	£116	£6 dec.
Grade III ... „	£64	£2 dec.
c Brass (rolled metal 2" to 12" basis) ... per lb.	7¾d.	—
c „ Tubes (solid drawn) ... „	9½d. to 10d.	—
c „ Wire, basis ... „	7¾d.	—
c Copper Tubes (solid-drawn) ... „	10½d.	—
g „ Bars (best selected) ... per ton	£68	—
g „ Sheet ... „		
g „ Rod ... „		
d „ (Electrolytic) Bars ... „	£41	£5/12/6 dec.
d „ „ Wire Rods ... „	£46 10s.	2/6 dec.
d „ „ H.C. Wire ... per lb	7¾d.	¼d. dec.
f Ebonite Rod ... „	1/6 to 2/– plus	—
f „ Sheet ... „	1/3 to 1/6 10%	—
n German Silver Wire ... „	2/5	—
k Gutta-percha, fine ... „	nom.	—
k India-rubber, Para-fine ... „	9½d.	¼d. inc.
i Iron, Pig (Cleveland No. 3) ... per ton	67/6	—
i „ Wire galv. No. 1, P.O. Qual. ... „	£20	—
g Lead, English Pig ... „	£17	—
g Mercury ... per bot.	£11/17/6 to £12/7/6	—
e Mica (in original cases) small ... per lb.	9d. to 1/6	—
e „ „ „ medium ... „	5/– to 10/–	—
e „ „ „ large ... „	10/6 to 17/6 up	—
p Phosphor Bronze, plain castings ... „	1/1	—
p „ „ drawn bars & rods „	11¼d.	—
p „ „ rolled strip & sheet „	11½d.	—
p „ „ wire ... ... „	1/0½d.	—
o Platinum ... ... per oz.	£7 10s.	10s. inc.
d Silicium Bronze Wire ... per lb.	8d.	½d. dec.
g Spelter ... ... per ton	£13 13s. 9d.	1/3 dec.
r Steel, Magnet, in bars ... per lb.	7½d.	—
g Tin, Block (English) ... per ton	£181	10/– dec.
n „ Wire, Nos. 1 to 16 ... per lb.	3/8	—

Quotations supplied by:—

a G. Boor & Co.
b The British Aluminium Co., Ltd.
c Thos. Bolton & Sons, Ltd.
d Frederick Smith & Co.
e F. Wiggins & Sons.
India Rubber, Gutta Percha and Telegraph Works Co., Ltd.
g Henry Gardner & Co., Ltd.
h Edward Till & Co.
i Bolling & Lowe.
n P. Ormiston & Sons.
o Johnson Matthey & Co.
p C. Clifford & Sons, Ltd.
r W. F. Dennis & Co.

The above table is published here fortnightly. In alternate issues, in which it does not appear, the latest prices of copper, silicium bronze wire, lead, rubber, tin and spelter, up to the time of going to press, are given in our "Business Notes" under the same heading.

New Catalogues and Lists

Radiovisor Parent, Ltd., 28, Little Russell Street, London, W.C.1.—Details of industrial smoke indicators and smoke alarm equipment.

Wholesale Electric Co., Ltd., 37, Vauxhall Bridge Road, London, S.W.1.—A complete 80-page illustrated catalogue of electrical accessories.

Strand Electric & Engineering Co., Ltd., Floral Street, Garrick Street, Covent Garden, London, W.C.1, have issued a well illustrated 120-page book printed on art paper dealing with theatre lighting and signs.

H. J. Scott & Co., Ltd., Volt Works, Ravenhill Avenue, Belfast.—A card listing Scott motors.

Metropolitan-Vickers Electrical Co., Ltd., Trafford Park, Manchester.—A list of fractional horse-power motors, including all essential information.

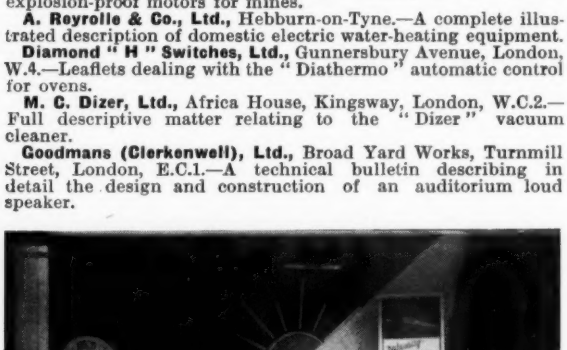
Laurence, Scott & Electromotors, Ltd., Australia House, Strand, London, W.C.2.—A publication dealing with flame- and explosion-proof motors for mines.

A. Reyrolle & Co., Ltd., Hebburn-on-Tyne.—A complete illustrated description of domestic electric water-heating equipment.

Diamond " H " Switches, Ltd., Gunnersbury Avenue, London, W.4.—Leaflets dealing with the " Diathermo " automatic control for ovens.

M. C. Dizer, Ltd., Africa House, Kingsway, London, W.C.2.—Full descriptive matter relating to the " Dizer " vacuum cleaner.

Goodmans (Clerkenwell), Ltd., Broad Yard Works, Turnmill Street, London, E.C.1.—A technical bulletin describing in detail the design and construction of an auditorium loud speaker.



A display by the G.E.C. at the recent British Trade Fair, Singapore

Ward & Goldstone, Ltd., Frederick Road, Pendleton, Manchester, 6.—Pamphlets giving details of the " Metocel," " Overseas," " Telestat," and " Statoformer " systems of radio interference suppression.

Pyrene Co., Ltd., Great West Road, Brentford.—A new 76-page booklet dealing with fire prevention, including appliances for use with electrical plant, such as oil-cooled transformers, switchgear, &c.

Constructors, Ltd., Nickel Works, Tyburn Road, Erdington, Birmingham.—This company has issued a catalogue of cycle *parks*, not parts, as was incorrectly stated last week.

Briton Lamps, Ltd., Roman Wall House, Crutched Friars, London, E.C.3.—A comprehensive catalogue of the company's lamps.

Bankruptcy Proceedings

Midland Electrical Installations (a firm) (other than Sidney Hinchliffe), electrical engineers, 443, Meadow Lane, Nottingham.—The first meeting of creditors was held at the Official Receiver's Office, 22, Regent Street, Park Row, Nottingham, on June 23rd. It was reported that the gross liabilities were £213 and there were estimated assets of £8. The failure was attributed to losses sustained owing to low prices at which work was executed. The matter was left in the hands of the Official Receiver.

C. E. Hallam, trading as Midland Radio Service, wireless and electrical dealer, 342, Meadow Lane, 191, Arkwright Street, and 275A, Arkwright Street, all Nottingham.—The first meeting of creditors was held at the Official Receiver's Office, 22, Regent Street, Park Row, Nottingham, on June 23rd. According to the statement of affairs filed there were ranking liabilities of £284 with assets of £121, leaving a deficiency of £162. Debtor attributed his failure to free servicing of wireless sets and overhead expenses being too heavy in relation to the turnover. The matter was left in the hands of the Official Receiver, as trustee.

C. W. Coombes, " Verdley," Portsmouth Road, Milford, Surrey, electrical engineer.—The public examination was held at Guildford recently. It was stated that the gross liabilities amounted to £350 and the deficiency to £163. Debtor said he commenced trading in 1918 in partnership with another at Hindhead. That partnership was dissolved in 1931, and debtor's partner agreed to pay him £700 at the rate of £10 a month. Debtor continued trading on his own account at Milford, but the business was not successful; he lost contracts, and he had been ill. The examination was adjourned.

J. C. Parnell, 82, Langdale Road, Hove, Sussex, lately trading as " The Ventnor Wireless Co.," 150, High Street, Ventnor, Isle of Wight, wireless dealer.—The first meeting of creditors was held on June 23rd at the Official Receiver's Office, 87, High Street, Portsmouth. The statement of affairs showed ranking liabilities of £499 and assets of £41. The case being a summary one was left in the hands of the Official Receiver as trustee.

D. W. J. Prentice, electrical engineer, 59, Brecon Road, Fulham, S.W.—Receiving order made June 18th on a creditor's petition. Public examination July 28th at Bankruptcy Buildings, Carey Street, W.C.

H. V. Curtis, wireless and electrical engineer, 20, Trent Road, Brixton, S.W.—Last day for receiving proofs for dividend July 8th. Trustee, Mr. H. S. Gotelee, 9, Arcade Street, Ipswich, Official Receiver.

E. J. Levermore, electrician, The Cycle Shop, Queen's Road, Weybridge.—Last day for receiving proofs for dividend July 10th. Trustee, Mr. C. R. Waterer, 29, Russell Square, W.C., Official Receiver.

W. C. Bryant, electrical and wireless engineer, 13, Rodbourne Road, Swindon.—Last day for receiving proof for dividend July 10th. Trustee, Mr. H. Wheeler, 26, Baldwin Street, Bristol, Official Receiver.

E. W. Hills, radio dealer, 20, Havelock Road, Hastings.—First and final dividend of 2s. in the £, payable July 15th at 24, Ship Street, Brighton.

C. A. Brown, wireless and electrical engineer, 36, Leagrave Road, Luton.—Application for discharge to be heard on August 6th at the Court House, Luton.

H. C. Bridgman, electrical engineer, 37, Canynge Road, Clifton, Bristol.—Trustee, Mr. H. Wheeler, 26, Baldwin Street, Bristol, Official Receiver, released May 27th.

P. & L. Radio, wireless dealers, 11, Manor Green Road, Epsom.—Receiving order made June 22nd on a creditor's petition.

C. A. Lamb, electrician, 8, Clarendon Place, Hyde.—Receiving order made June 18th on debtor's own petition. First meeting July 3rd at 22, Byrom Street, Manchester. Public examination July 27th at the Town Hall, Ashton-under-Lyne.

A. E. Hudgell, radio dealer, 12, Argyle Road, North Finchley.—Receiving order made June 22nd on debtor's own petition.

G. Mitchell, electrical engineer, 6, Connaught Terrace, Hove.—Receiving order made June 20th on a creditor's petition.

Company Liquidations

Alandale Radio & Television Syndicate, Ltd., of Woolwich, Poplar, Bexley Heath, and Chatham.—The statutory first meetings of creditors and shareholders under the compulsory liquidation of this company were held on June 23rd at the Board of Trade Offices, Carey Street, W.C., before Mr. C. W. Bird, Assistant Official Receiver. A statement of affairs was submitted showing liabilities of £3,754, assets valued at £921, and an issued capital of £1,000. The failure of the company was attributed by the directors to severe and increasing competition at all the branches; also to excessive allowances made on wireless receivers taken in part exchange and to depreciation in the value of unsold stock. In the opinion of the Official Receiver the failure was also due to mismanagement in that sufficient working capital was not provided. Mr. C. Latham was appointed liquidator with a committee of inspection.

Wholesale Service Co., Ltd., radio factors and engineers, New Barn Street, London, E.13.—The statutory meeting of creditors of the above was held on June 23rd at the Holborn Restaurant, London, W.C. The statement of affairs showed ranking liabilities of £5,308, all due to unsecured creditors. After allowing £133 for preferential claims and £310 due on debentures, the net assets were £2,063, leaving a deficiency, so far as the creditors were concerned, of £3,245. It was reported that the shareholders had previously passed the usual resolution for the voluntary liquidation of the company and had nominated Miss L. M. Harris, 103, Kingsway, London, W.C., as liquidator.

Braunton Electric Light & Power Co., Ltd.—Meeting July 31st at 47, Parliament Street, Westminster, S.W.1, to receive an account of the winding-up by the liquidator, Mr. H. N. Morgan-Grenville.

Private Arrangements

Lesco Trading Co., Ltd., Brewery Road, London, N.7, wireless and electrical dealers.—A meeting of creditors was held on June 26th at 3, Duke Street, Adelphi, London, W.C., when Mr. Winter, one of the directors, presided, and submitted a statement of affairs showing liabilities of £3,892, of which £500 was due to a debenture holder. The total assets were £4,332, with a deficiency of £4,561. Mr. Winter said that a receiver for the debenture holders was appointed on June 15th, but he and the other directors were confident that if fresh capital could have been introduced they would have been able to pull the business round. Unfortunately up to the time of calling the meeting of creditors the directors had been unable to obtain additional cash. They therefore left the matter in the hands of the company's creditors. Mr. L. Hyams, C.A., of Cheapside, E.C., the receiver appointed by the debenture holders, said that his investigations showed that from January to June 15th, 1936, there had been a gross loss on trading. The directors must have been very much out in their costings. It was decided to appoint a committee of five of the creditors to go into the matter further with the receiver for the debenture holders and report to an adjourned meeting of creditors.

C. R. Moffett, electrical and wireless dealer and contractor, 544, Anlaby Road, Hull.—The creditors herein were called together recently when a statement of affairs was submitted which showed ranking liabilities of £1,176, and in addition there were fully secured creditors for £370. After allowing £13 for preferential claims the net assets were £509, leaving a deficiency of £667. A resolution was passed confirming the deed and a committee was appointed consisting of the representatives of Messrs. T. Beadle & Co., Ltd., Falk, Stadelmann & Co., Ltd., and Philco (Northern) Distributors, Ltd.

L. W. Bryan, electrical contractor, 96, Woodchurch Road, Birkenhead.—The creditors were called together recently at the offices of Mr. P. S. Booth, 2, Bixteth Street, Liverpool. A statement of affairs was submitted which showed liabilities of £690 and net assets of £349, leaving a deficiency of £341. The position was attributed to family ill-health. The principal asset was contracts for installations in houses under the assisted wiring scheme of the Birkenhead Corporation, and could only be realised upon due fulfilment of the orders issued and accepted. An offer was made of a composition of 6s. 8d. in the £, which is was decided should be accepted.

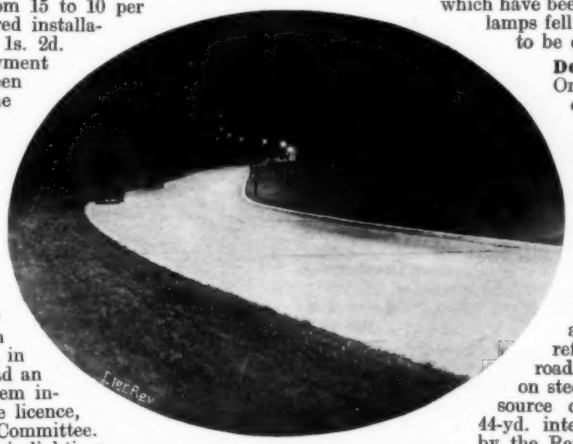
Electricity Supply

Lighting, Domestic, Power

Annfield Plain (Co. Durham).—LOWER CHARGES.—Reductions in electricity charges have been approved by the Urban District Council. For ordinary lighting and power purposes an all-round reduction of ¼d. per kWh has been made, while for heating and cooking there will be a discount of 10 per cent. if the account is paid within a prescribed period. A reduction of ¼d. a kWh is proposed for domestic consumers, but the discount is reduced from 15 to 10 per cent., while the charge for hired installations has been decreased from 1s. 2d. to 6d. monthly. For prepayment consumers the discount has been increased by 5 per cent., and the charge for public lighting is also being reduced.

Barking.—LOANS.—The Corporation has applied for a loan of £40,233 for sub-stations, equipment, mains, and house services for house estates at Becontree.

Barrow-in-Furness. — ELECTRICITY AS ALTERNATIVE LIGHTING SUPPLY.—An application by Mr. J. Brennan for permission to install in the Roxy cinema in course of erection in Abbey Road an alternative electric lighting system instead of gas, as required by the licence, has been granted by the Watch Committee. Monthly inspections of the electric lighting systems at all the town cinemas and theatres are to be carried out in future.



The Broadway, Derby, iluminated by sodium-discharge lamps in Revo fittings

EXTENSIONS.—The Electricity Committee is seeking sanction to borrow £31,130 for mains, transformers and switchgear for the extension of the extra-high-voltage system.

Beccles.—TRADERS AND ELECTRICITY CHARGES.—Representations are to be made by the Chamber of Trade to the Minister of Transport for an alteration of the authorised maximum prices permitted to be charged by the East Anglian Electricity Co., Ltd.

Bedford.—MAINS EXTENSIONS.—The following extensions of mains are to be carried out by the Electricity Committee: To Kempston sewage works (£1,050), to Old Harrowden (£270), and to Marston Jubilee Hall (£30).

Birkenhead.—BULK SUPPLY.—The Mersey Railway Company has accepted the Birkenhead Corporation's offer of a bulk supply of electricity to augment that generated by the company. The total estimated amounts to be paid by the Corporation and the Mersey Railway Company respectively for the necessary mains and plant are £2,024 and £8,440.

VEHICLE BATTERY CHARGING.—A special rate for charging electric vehicles of ¼d. per kWh during off-peak hours has been fixed by the Electricity Committee.

Birmingham.—NEW SUB-STATIONS.—The Electric Supply Department is to erect sub-stations at Gilbertstone Estate, Yardley; Damson Lane, Elmdon Heath; Geoffrey Road, Hall Green; Strathdene Road, Weoley Park; and The Nurseries, Ridgacre Lane, Quinton.

Blaydon-on-Tyne.—HIGH-VOLTAGE CABLES.—The North-Eastern Electric Supply Co., Ltd., has submitted plans to the Urban District Council for an underground cable and overhead 20,000-V line from Spa Well to the district boundary west of Barlow. The Council has agreed to approach the Ministry of Transport with a view to having the overhead line placed underground compulsorily, and it has also been decided to seek the views of the Durham County Council on the matter.

Bournemouth.—ROAD LIGHTING.—Sanction has been obtained by the Lighting Committee to a loan of £7,136 for main-road lighting.

Bradford.—MAINS AND SERVICES.—Application for sanction to borrow £200,000 for anticipated expenditure on mains and house services over a period of three years has been authorised by the Electricity Committee.

Bridge-Blean. — ELECTRICITY FOR COUNCIL HOUSES. — The Rural District Council has consented to the local supply company installing electricity in Council houses, free of expense to the Council.

Bridlington.—STREET-LIGHTING IMPROVEMENTS.—The borough electrical engineer has prepared a £4,500 scheme for improving the electric street-lighting system.

Brighton.—NEW SUB-STATIONS.—In order to provide for the increasing demand for electricity caused by the installation of electric cookers on the Queen's Park Estate, a new sub-station is to be erected at a cost of £3,000. A sub-station is to be erected and mains extended at a cost of £6,380 on the East Moulsecoomb estate, and another sub-station is to be built at a cost of £3,221 to supply the Hangleton Estate, Hove, which is being developed by Messrs. Braybons, Ltd. In addition a sub-station is to be provided in Hartfield Road to give a further supply to the Saltdean Estate Co. at a cost of £3,084, and mains and a sub-station are being provided at a cost of £6,679 to supply the Cowhayes Estate, Portslade.

STEAM PLANT AUXILIARIES.—The Electricity Committee is to obtain tenders for the supply of two boiler feed pumps, one steam-driven pump, and eight 90-h.p. and eight 1½-h.p. electric motors and switchgear.

ELECTRIC HEATING FOR A SCHOOL.—The Ministry of Health has sanctioned a loan of £1,159 for the installation of electric heating at the Patcham junior school.

Cottingham (Northants).—STREET LIGHTING.—The streets, which have been without lights since the paraffin lamps fell into disuse twenty years ago, are to be electrically lighted.

Derby.—SODIUM STREET LIGHTING.—On Broadway, Derby, sodium electric-discharge lamps have been installed. The installation approaches very nearly Class "D" of the B.S.I. Specification No. 307, with a mean minimum intensity of 0.179 ft.-candles, and a diversity of no more than 2.1 to 1, giving an average illumination on the road surface of 0.267 ft.-candles without glare. The 90-W units are mounted in "Magnalite" reflector fittings 25 ft. above the road surface from adjustable brackets on steel poles extending to support the source centrally over the roadway at 44-yd. intervals. The fittings were made by the Revo Electric Co., Ltd.

Finchley.—SUPPLY IMPROVEMENTS.—The Electricity Committee is to improve the supply in the Hampstead Garden Suburb at a cost of £3,226, and extend cables and provide a new extra-high-voltage switchboard, &c., at a cost of £5,479.

France. — PROGRESS OF ELECTRIFICATION. — According to statistics issued by the Service Centrale des Forces Hydrauliques et des Distributions d'Energie Electrique, and quoted by *Reuter's Trade Service* from Paris, the total capacity of French electric power plants now amounts to 10,500,000 kW. In 1923, when the statistics were first kept, only 4,500,000 kW was installed. The proportion of hydro-electric power stations has continued to increase; in 1923 it was 29 per cent., while last year it was 34. At the moment there are twenty stations with a capacity of over 100,000 kW (fifteen thermal and five water-power), and 531 stations of over 1,000 kW (244 thermal and 287 water-power). In the same period (1923-1935) the total production rose from 7,500,000,000 kWh to 15,500,000,000 kWh an increase of 105 per cent. The consumption rose from 6,500 million kWh to 13,000 million kWh. It reached its maximum in 1930 with 13,635 million, and fell to 11,816 million in 1932. Since then it has risen more slowly than production. The average consumption per head of the population has risen from 163 kWh in 1923 to 319 in 1935, with a maximum of 334 in 1930. At 478,396 km. last year the total length of transport and distribution lines compares with 163,481 km. in 1926.

Glasgow.—HOSPITALS TO TAKE BULK SUPPLY.—In place of installing new generating plant at Woodilee Mental Hospital arrangements have been made to take a supply of electricity from the Clyde Valley Electrical Power Co. At the Stobhill hospital, in view of the installation of additional X-ray plant, the Health Committee has agreed that the present generating station within the institution grounds shall be shut down and arrangements made for the whole supply of electricity to be taken from the Corporation Electricity Department.

Grimsby.—SUPPLY EXTENSIONS.—At a cost of of £11,150 the Electricity Committee is to provide a supply to Grainthorpe, Conisholme, and North Somercotes.

Hawarden.—DOMESTIC TARIFF.—A new tariff for domestic premises has been introduced by the Council as follows: (a) fixed quarterly charge of 5s., plus 3 per cent. of the gross value; (b) a "unit" charge of ¾d. Premises rated at less than £10 are deemed to be rated at £10. Slot meters: 2d. per kWh for the first 45 kWh, plus 5.4 kWh per £1 gross value; afterwards at a rate of ¾d. per kWh. Shops: (a) a fixed quarterly charge of 10s., plus 5½ per cent. of the gross value; (b) a "unit" charge of ¾d. Premises rated at less than £20 are deemed to be rated at £20.

Ilford.—RECTIFYING PLANT.—The Electricity Committee has obtained sanction to borrow £5,400 for rectifying plant.

APPARATUS ON HIRE.—Sanction to borrow £20,000 for electrical apparatus for hire is being sought by the Electricity Committee.

NEW FEEDERS.—The Electricity Committee is to provide new feeders and switchgear at a cost of £10,386.

CORONATION FLOODLIGHTING.—The electrical engineer has been asked to suggest schemes for floodlighting in connection with the Coronation celebrations.

Isle of Wight.—LOWER CHARGES.—The Electric Light & Power Co., Ltd., has reduced the "unit" charge under the two-part tariffs to ¾d.; for heating and cooking to 1d.; for

small power, first scale, to 2½d.; and for water heating to ½d. All meter rents are reduced to 1s. per quarter.

Jarrow-on-Tyne.—ELECTRICITY WANTED.—A plebiscite of the tenants on the Town Council's housing estate has resulted in 67.4 per cent. voting in favour of electricity being installed. The result is being communicated to the Ministry of Health.

Leicester.—MORE FAVOURABLE CHARGES.—The Leicestershire and Warwickshire Power Company has decided on a reduction in the price of electricity.

Llanrwst.—FUTURE OF ELECTRICITY UNDERTAKING.—A representative of the North Wales Power Co. has been interviewed by the Urban District Council with a view to ascertaining what guarantees on present and future charges for electricity the company was prepared to make in order that the Council might be in a position to decide before the end of July whether or not to exercise its rights to purchase the undertaking as provided for in the Provisional Order. It was eventually decided to ask the company whether, in the event of the Council's right to purchase the undertaking being waived, the company would undertake to make a substantial reduction in the lighting flat rate forthwith or within the next few years; that in the event of the company making a reduction in the charges for a bulk supply to any town the company would effect a reduction in the retail charges at Llanrwst, and whether the company would extend the supply to the Tafarnfedw and Berthddu area forthwith, improve the present street lighting in Llanrwst, and reduce the present charges for public lighting. The company has asked for a further interview.

London.—FULHAM.—Messrs. Albion T. Snell & Partners have been appointed by the Health Committee as consultants to prepare the scheme for thermal storage and hot-water installations at the new maternity home. A sum of £13,050 is to be spent on improvements in street lighting.

HACKNEY.—Sanction to borrow £30,000 for service lines is being sought by the Electricity Committee, and a scheme, costing £74,400, for the improvement of street lighting has been prepared.

ST. PANCRAS.—A sum of £653 is to be spent by the Electricity Committee on switchgear at the Arlington Road and Highgate Street sub-stations. Mains extensions are also to be carried out at a cost of £1,544.

HAMMERSMITH.—A supply of electricity is to be given by the Council to Burlington School, Wood Lane, at a cost of £257.

Maidstone.—CHANGE-OVER.—The Corporation has decided to proceed with the change-over in the Foster Street and Church Street areas at a cost of £11,000.

Manchester.—LOWER CHARGES.—Subject to the approval of the City Council, electricity supplied under the ordinary rate will be reduced from 4½d. to 4d. per kWh in July.

NEW EQUIPMENT.—Sanction to borrow £25,500 for mains and £4,000 for switchgear has been obtained by the Electricity Committee.

HOSPITAL HEATING.—The Health Committee is to install electric heating at Abergele children's hospital at a cost of £515.

New Zealand.—ELECTRICITY IN THE HUTT VALLEY.—A general improvement is indicated by Mr. E. F. Hollands, engineer and general manager, in his report of the working of the Hutt Valley Electric Power Board during the year ended March 31st this year. There was a rise in the total income by £11,994 to £119,469, the biggest proportional increase being for heating and cooking. The total expenditure was £89,870 and the net profit £9,603.

Orrell (Lancs).—INSTALLATION OF ELECTRICITY.—Electricity is to be installed in seventy-two houses in Linden Avenue, and in all other Council houses at present supplied with gas, at an estimated cost of £820, for which a loan is being sought.

Portland.—NEW METHOD OF CHARGING.—The club tariff has been altered so that instead of making the fixed charge payable in equal proportions each quarter one-sixth shall be charged in each of the summer quarters and one-third in each of the winter quarters, and if under the two-part tariff the average "unit" cost per quarter exceeds the flat rate of 7d. per kWh the tariff will be ignored and the consumption charged at the flat rate in force.

Reigate.—NEW CABLE FOR INSTITUTION.—In view of the probable power requirements for hot water, lifts, &c., at St. Anne's Institution, Redhill, the Town Council has decided to replace the existing single-phase cable by a three-phase cable. The Surrey Public Assistance Committee will provide a second cable to afford a duplicate supply of electricity, in case of failure, within the Institution grounds, at a cost of £105.

Scunthorpe (Lincs).—REDUCTIONS.—In view of the profit of £5,768 made last year on the electricity undertaking the Urban District Council has decided upon an all-round reduction of ½d. per kWh, plus certain other concessions to business users.

Sheffield.—MAINS EXTENSIONS.—The Electricity Committee is to extend mains at a cost of £10,000.

Skipton.—NEW SHOWROOMS JUSTIFIED.—The electrical engineer, Mr. W. V. Smythe, reports that since the new showrooms in the centre of the town were opened last December fifty cookers, seventy fires, and a number of other appliances have been sold.

Stalybridge and District.—COOKER WIRING.—The electrical engineer to the Stalybridge, Hyde, Mossley and Dukinfield Tramways and Electricity Board is making arrangements with builders for the installation of cooker wiring in all new houses where a supply of electricity is required.

Stoke-on-Trent.—SUPPLY DEPARTMENT ACTIVITIES.—The Electricity Commissioners have sanctioned the borrowing of £5,250 for the provision of an extra high voltage feeder from the generating station to the Wesley Street sub-station, Fenton. This month the Department is to proceed with the change-over from d.c. to a.c. in the Brownhills (Tunstall) district. A supply is to be given to houses at Chaplin Road, Longton, and Barlaston Old Road and Hem Heath, Trentham. The Electricity Committee has agreed to a suggestion from the Highways and Plans Committee that the Department should co-operate in connection with a Shopping Week to be organised in the Hanley district in the matter of additional street lighting and the illumination of public buildings. A low-voltage interconnecting main is to be laid in the Spode Street area at a cost of £1,750. The supply to the Burslem sewage works is to be improved at a cost of £1,300.

Stone (Staffs.).—REVISED CHARGES.—The following amended charges for electricity have been approved by the Electricity Committee:—Heating 2d. per kWh; cooking and heating (where cooker is used) 1d. per kWh; and refrigerators 1d. per kWh.

Swanley.—HOSPITAL INSTALLATION.—A revised estimate of £4,665 for an electrical installation at White Oak Hospital has been approved by the London County Council.

Wallasey.—MAINS AND PLANT.—The Electricity Committee has obtained sanction to borrow £10,893 for mains and £14,500 for plant.

Wellingborough.—OVERHEAD CABLES.—After several years of opposition to overhead cables, the Urban District Council has consented to the erection of certain lines for a temporary period of three years to assist developments on the western side of the town. The Wellingborough Electric Supply Co., Ltd., is to erect lines from Kingsway on the Council's Doddington Road housing estate to the Wilby Grange estate on Northampton Road, and from there to new properties in Brickhill Road.

West Sussex.—ELECTRICITY INSTALLATION.—The County Council is to install electricity at the Drayton highways depôt at a cost of £600.

Weymouth.—SUPPLY TO TORPEDO RANGE.—Application has been made by the Corporation for sanction to a loan of £1,582 for a high-voltage supply to Bincleaves torpedo range.

Wigton (Cumberland).—SUPPLY EXTENSION.—Approval has been given by the Rural District Council to the terms of the Mid-Cumberland Electricity Co., Ltd., for supplying electricity to Blennerhasset but the Torpenhow scheme has been deferred.

Worksop.—EXTENSIONS.—The Town Council has approved the borrowing of £9,000 for extensions to the electricity works. A further £800 for the provision of larger cables, in conjunction with this extension, was also approved.

Traction

France.—ROTARY CONVERTERS FOR RAILWAYS.—The Société Oerlikon of Paris has recently supplied sixteen rotary converters for use in connection with the electrification of the Vierzon-Brive section of the Paris-Orléans-Midi Railway. These converters have been installed in automatic sub-stations and are being employed in converting a three-phase supply at 50 cycles to d.c. at 1,500 V. The machines are of the six-phase type, and are provided with interpoles and compound windings. They are designed for a continuous output of 1,000 kW or 1,333 A at 750 V and 600 r.p.m., two machines being connected in series. The specified overload capacity was 1,500 kW at 750 V for two hours and 3,000 kW (4,000 A) at 750 V for five minutes, without the temperature exceeding the permissible limits.

Glasgow.—MODERN SIGNALLING.—The London and North-Eastern Railway Co. is to substitute a modern system of signaling at Cowlairs, Glasgow. The scheme provides for the elimination of five mechanically operated signal boxes, which will be replaced by two electrically operated boxes. It is also intended to provide continuous track circuiting on the main running lines, and all points and signals will be electrically operated, the latter being of the multi-aspect colour light type. Route indicators and subsidiary signals will also be provided. The supply of electrical energy will be obtained from the Glasgow Corporation, and, for emergency working, there will be a small standby plant.

Hull.—TROLLEY-BUSES.—In connection with the proposal to run trolley-buses the Corporation has decided to seek sanction to a loan of £37,000 for the provision of sub-stations.

Llandudno.—TROLLEY-BUSES.—Approval in principle has been given by the Council to a proposal to substitute trolley vehicles for the existing tramcars on the Llandudno and Colwyn Bay Electric Railway. Representatives have been appointed to discuss the question of road works consequent upon the introduction of these vehicles and the abandonment of the existing tram track.

London.—A TEN-MILE TROLLEY-BUS CONVERSION.—Trolley-buses will run for the first time between Hammersmith and Edgware, a total distance of 12¾ miles, on Sunday next. The new section between Acton and Edgware is ten miles long. For a few weeks, until the work of converting other routes in this area has been completed, trams will continue to run as well as trolley-buses. The Acton to Edgware section is the first instalment of London Transport's scheme to replace trams

An A.E.C. trolley-bus of the type that will be used on the Acton-Edgware route

by trolley-buses on 150 miles of route in the North of London. For this section A.E.C. six-wheel 70-seater trolley-buses will be used.

Russia.—ELECTRIC TRAMCARS IN MOSCOW.—A new type of electric tramcar, built at the Soknolniki Works, and claimed to have a maximum speed of 40 m.p.h., has recently been put into service in Moscow. The cars, which run in pairs, are each 49 ft. in length, and, together, can accommodate 107 sitting and 93 standing passengers. Each car has four automatically controlled doors—a wide one for entry and three for exit. The driver is provided with a seat in an enclosed cab. The electrical equipment of the cars, which includes lighting and heating, is stated to be entirely of Russian manufacture, and regenerative braking is employed.

Sweden.—ELECTRIFICATION OF RAILWAYS.—*Reuter's Trade Service* reports from Stockholm that as a consequence of several private motions urging the electrification of different State railway lines, the Budget Commission of the Riksdag recommended that the Riksdag should ask the Government to make an investigation into the question of the continuance of the electrification of State railway lines. The Budget Commission recalled the fact that the present electrification schemes would all be completed in the near future, and that then the organisation established for this purpose would have to be disbanded. It is true that, according to investigations made by the Railway Board, there are now no more State railway lines which could be economically electrified, but the Budget Commission expressed the opinion that the demand that the State railways should always be remunerative ought not to be allowed to check their natural development and continued technical adaptation to the requirements of the times. Both chambers of the Riksdag have complied with the Budget Commission's request.

Communications

Brazil.—TELEPHONIC COMMUNICATIONS.—Some interesting details regarding the progress made in connection with telephonic communication in Brazil last year are given in a report of the Brazilian Traction, Light and Power Co., Ltd. It is stated that the number of new subscribers to the various telephone undertakings affiliated to the concern increased by 14,148 during 1935. In the Rio de Janeiro Federal district, the Villa relay station with 6,000 new lines was completed. A new exchange to serve the Botafogo area, and to replace the old Sud exchange, is approaching completion. At the North exchange provision is being made for automatic operation, the work being already half completed. At the Central exchange 4,000 new lines and at the Impanema exchange 2,000 new lines have been installed. At the exchange in the town of Bello Horizonte 1,500 new automatic lines have been installed, while at the Jardim America exchange in San Paulo automatic working has been adopted.

Great Britain.—RADIO LICENCES.—During May there was an increase of 30,000 in the number of wireless licences issued, bringing the total in force to 7,671,760 as compared with 7,092,596 at the end of May, 1935.

CHEAPER RADIO MESSAGES.—On July 1st lower charges for radio-telephone calls to Canada and the United States came into operation, the reduction being from £2 to £1 8s. per minute during the day; to Cuba and Mexico the charge is now £2 instead £2 12s. per minute. Radio telegrams to and from British ships at sea are also to be cheaper.

Hull.—MUNICIPAL TELEPHONE RESULTS.—The year's working of the municipal telephone system has resulted in a profit of £20,957, after payment of interest, loan charges and income-tax. The number of telephones in that area exceeds 20,000, 90 per cent. of which are connected to the automatic exchanges.

Manchuria.—TELEPHONIC COMMUNICATION.—According to the *Far Eastern Review*, direct telephonic communication between Tokyo, Japan, and Changchun, will be possible within the next two years under the terms of an agreement recently concluded between the two Governments. The project will be undertaken by the Japanese Ministry of Communications and the Manchuria Telephone & Telegraph Co.

New Zealand.—MORE LISTENERS IN NEW ZEALAND.—The number of wireless listeners increased by over 25 per cent. during the past twelve months, states *Reuter* from Wellington. The total number of licences issued is now 200,369, an increase of 50,000 compared with last year.

The Future of the B.B.C.

THE White Paper which contains the Government's decisions on the report of the Ullswater Committee with regard to the future of the B.B.C. shows that practically all the Committee's recommendations have been adopted. The outstanding modifications relate to radio relay exchanges. With regard to the Committee's recommendation that the ownership and operation of these services should be undertaken by the Post Office and the control of their programmes by the B.B.C., the Government proposes to extend for three years the system of licensing relay exchanges, subject to certain additional provisions, to the condition that every such licence will be liable to be terminated on December 31st, 1939, and to the continuance of the present provision whereby the Postmaster-General may, on the termination of any relay exchange licence, require the licensee to sell to him such portions of the plant and apparatus as he may specify. Proprietors of relay exchanges and those responsible for arrangements entered into with them, such as local authorities, must understand that they have no guarantee or assurance in any form that any licences will be continued beyond the end of the year 1939, and that there can be no question of compensation for any commitments beyond that date. In the meantime, the Government proposes that the Post Office should undertake technical research and practical experimental work in distributing broadcast programmes by wire. Recommendations that the technical investigation of interference with broadcast reception should be completed as soon as possible, and that, if necessary, further powers should be sought, were accepted.

The relay service must reach a reasonable standard of efficiency in technical and other aspects, and inquiries will be made into what extent it will be practicable to require those undertakings which at present only offer one programme to arrange to give an alternative.

With regard to the B.B.C. itself the Government has accepted the recommendations that its charter should be extended to December 31st, 1946, that the number of governors should be increased to seven and that the salary of the chairman should remain at £3,000, that of the governors being fixed at £1,000. The proposal that the responsibility for the cultural side should be transferred to a Cabinet Minister has been rejected in favour of the continuance of the existing functions of the Postmaster-General. The estimates for broadcasting are to be presented separately from the Post Office estimates in future and the licence fee will remain at 10s., the percentage of licence revenue to be allocated to the Post Office to be fixed for periods of two years.

The Ullswater Committee recommended that the share of the remaining net licence revenue to be allocated to the B.B.C. month by month, for purposes other than television, should be not less than 75 per cent., and that the balance of the licence revenue should be regarded as potentially available for broadcasting so far as it might be required, any residue being assigned to the State. The Government accepts the view of the Committee that there should be some increase in the initial assignment of revenue to the Corporation. It proposes to fix this at 75 per cent. of the net licence revenue, with the proviso that, if the Treasury should hereafter be satisfied that the income of the B.B.C. is insufficient to support its services, including television and Empire broadcasting, it should be open to the Treasury to approve such increase as it may think appropriate in the circumstances in the proportion of receiving licence revenue payable to the B.B.C. The share of receiving licence revenue to be paid to and retained by the Exchequer in respect of the year 1936 is to be fixed at £1,050,000 (exclusive of the income-tax payable by the B.B.C.).

Every encouragement is being given by the Government to the development of the Empire broadcasting service and television. With regard to staff matters, changes are to be made to bring the B.B.C. more into line with the Civil Service.

Contract Information

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses

Contracts Open

Australia.—MELBOURNE.—August 5th. Victorian Railways. Armoured cable. (T.Y. 30407.)*

Boxhill.—July 7th. Electricity Committee. Collection, conversion and re-installation of d.c. wireless apparatus. (June 26th.)

Birmingham.—July 9th. City Council. Materials for relighting of city routes by 400-W mercury type discharge lamps. H. J. Manzoni, city engineer, Council House (deposit £2).

Blackpool.—July 15th. Borough Council. Vertical spindle axial flow pump with electric motor, starting gear and accessories at the Ansdell Road pumping station. Borough surveyor, Municipal Buildings (deposit £1).

Bradford.—July 8th. Corporation. Two 6,600-V reactors. (June 26th.)

Cowdenbeath.—July 8th. Town Council. Electrical wiring and fittings in 272 houses in the Stenhouse Street area. Borough surveyor, Town House.

Denbighshire.—July 17th. County Council. Electric lighting, fittings and bells at the administration block and casual wards of the Wrexham Institution. G. D. Wiles, County architect, Acton Hall, Wrexham (deposit £2 2s.).

Egypt.—August 18th. Ministry of the Interior. 400-kW electric generating set with foundations, accessories and spares at the Zagazig power station. (T.Y. 30321.)*

Essex.—July 20th. Public Assistance Committee. Electrical installation at Suttons Institution, Hornchurch. (June 26th.)

Exeter.—July 8th. Electricity Department. Transformers. (June 26th.)

Finchley.—July 27th. Borough Council. Metal-clad, air-insulated, l.v. switchgear. (See this issue.)

Glasgow.—July 7th. Education Department. Electrical work at East Keppoch temporary R.C. school. Education Offices (Property Department), 129, Bath Street (deposit £1 1s.).

July 9th. Electrical work at Shawlands elementary school alterations. Education Offices (Property Department) (deposit £1 1s.).

July 9th. Corporation. Electrical installation at 790 houses on the Berryknowes housing estate. Town Clerk's Office, Room 35.

Gravesend.—July 4th. Education Committee. Repairs, redecorations and electric lighting at Denton school. J. G. Bennett, borough architect, 5, Woodville Terrace.

Hastings.—July 9th. Electricity Department. One 3,000-kVA Scott-connected transformer with automatic on-load tap-changing equipment and protective gear. (June 26th.)

Hull.—July 21st. Electricity Committee. Generator set and testing load control board. (June 26th.)

India.—SIMLA.—August 13th. Stores Department. Electric lamps as required during the period from November 1st next to October 31st, 1937. (T. 30397.)*

Irish Free State.—DUBLIN.—July 15th. Commissioners of Public Works. Central heating, hot water, cooking and electrical equipment at Colaiste na Mumhan, Ballyvourney, Co. Cork. T. Cassedy, Office of Public Works (deposit £3).

Kingston-upon-Thames.—July 18th. Corporation. Street lighting equipment. (See this issue.)

Lichfield.—July 4th. Electricity Department. One 6-panel e.h.v. draw-out truck cubicle type switchboard and e.h.v. overhead line material. (June 19th.)

London.—CORPORATION OF TRINITY HOUSE.—July 13th. Alterations to existing buildings, dismantling of existing plant, and the installation of new engines and other machinery for fog signal and electric lighting at St. Ann's Lighthouse, Dale, Haverfordwest. J. M. Nicolle, secretary, Trinity House, Tower Hill, E.C.3.

BETHNAL GREEN.—July 6th. Borough Council. Domestic electric cookers. (June 26th.)

COMMISSIONERS OF WORKS.—July 9th. Electric wiring at the British Museum, N.W. Quadrant. (June 26th.)

ISLINGTON.—July 24th. Borough Council. Stores and materials for electrical installations. (See this issue.)

Manchester.—July 7th. Electricity Committee. One 200-kW rectifier equipment. (June 26th.)

July 9th. 1,530 yd. of 33,000-V single-conductor cable. H. C. Lamb, chief engineer and manager, Electricity Department, Town Hall.

July 14th. Transport Committee. Various supplies and works, including supply of cadmium-copper trolley wire. General manager, Corporation Transport Department, 55, Piccadilly.

Middlesbrough.—July 20th. Corporation. Twelve months' supply of 660-V and 11,000-V, p.i., l.c. double hessian taped cables. (See this issue.)

Northern Ireland.—BELFAST.—July 11th. Harbour Commissioners. Two electrically operated gantry cranes for the Queen's Quay. T. N. Burke, superintendent of cranes, Harbour Office.

Plymouth.—July 6th. Electricity Department. E.h.v. and l.v. cables. (June 26th.)

Sheffield.—July 13th. Electricity Committee. 450-kVA and 300-kVA transformers and 500-kVA Scott-connected sets. (June 26th.)

July 4th. Electric lighting installation at a school. A. Rayner, 161, Cross Hill, Ecclesfield.

South Africa.—PRETORIA.—July 17th. Union Tender & Supplies Board. Frequency meters and dial testers. (T. 30338.)*

Public Works Department. July 24th. Air-conditioning plant at the Hillbrow telephone exchange, Johannesburg. (T. 30358.)*

July 31st. Air-conditioning plant at the Elsenberg School of Agriculture Insectary, Stellenbosch. (T. 30359.)*

August 7th. Air-conditioning plant at the Springs telephone exchange, Johannesburg. (T. 30357.)*

CHRISTIANA.—July 22nd. Municipality. Power station plant and distribution network. (T.Y. 30368.)*

JOHANNESBURG.—July 30th. City Council. L.v. switchgear. (T.Y. 30340.)*

CAPE PROVINCE.—July 27th. Ceres Municipality. Power-station plant and conversion of overhead network from d.c. to a.c. (T.Y. 30367.)*

Stockton-on-Tees.—July 20th. Electricity Department. 11,000-V, three-phase switchgear, l.v. sub-station switchgear, and two 750-kVA outdoor transformers. (See this issue.)

Tiverton.—July 8th. Town Council. 3¾ miles of e.h.v. overhead and underground lines. (June 26th.)

Walton and Weybridge.—July 8th. U.D.C. Electricity Department. E.h.v. cable, transformer kiosk, e.h.v. pedestal type switchgear and ring-main controllers, transformers and l.v. feeder pillars. (June 26th.)

Warrington.—July 11th. Committee of Visitors. Installation of talking picture apparatus in the Recreation Hall, County Mental Hospital, Winwick. F. W. Uncles, clerk and steward, The Hospital (deposit £1 1s.).

Watford.—July 8th. Corporation. E.h.v. and l.v. p.i. cables for twelve months. (June 26th.)

* Further particulars from the Department of Overseas Trade (Inquiry Room), 35, Old Queen Street, London, S.W.1.

Contracts Closed

Barrow-in-Furness.—Electricity Committee. Accepted. Feeder panel (£173).—Met.-Vick. Elecl. Co. Chlorination plant (£240).—Paterson Engineering Co. 250-kVA transformer (£128).—British Electric Transformer Co. Rectifier plant (£8,294).—Electric Construction Co.

Birkenhead.—Electricity Committee. Accepted. Wiring forty-six houses under assisted scheme (£194).—Park Electrical Co. 6,600-V switch units.—Switchgear & Cowans, Ltd. (£568); A. Reyrolle & Co. (£1,324).

Brighton.—Health Committee. Accepted. Extra power points in seventy-four houses on the Whitehawk estate (£102).—Bostel Bros. X-ray apparatus (£361).—A. E. Dean & Co.

Electricity Committee. Accepted. Reactors (£700).—Fuller Electrical & Manufacturing Co. Submarine cables (£2,824).—Siemens Bros.

Durham.—County Education Committee. Accepted. Electrical installations at Grange Villa Council school (£137) and the Pelton Roseberry Council school (£255).—B. L. Oliver, Birtley.

Ealing.—Electricity Committee. 33-kV and 660-V switchgear for the Mall sub-station :—

	£		£
English Electric Co. Accepted ...	1,855	Reyrolle & Co.	2,004
G.E.C.	1,912	Park Royal Eng. Co.	2,017
Met.-Vick. Electl. Co.	1,919	New Switchgear Construction Co.	2,038
Ferguson, Pailin, Ltd.	1,950	Allen West & Co.	2,041
B.T.H.	1,974	Johnson & Phillips	2,048
Bertram Thomas	1,992	Switchgear & Cowans	2,111

Finchley.—Electricity Committee. Accepted. Rectifier equipment (£9,815).—G.E.C. Balancer sets (£292).—Electric Construction Co. Transformers.—Bruce Peebles & Co. Switchgear (£3,665).—A. Reyrolle & Co.

Glasgow.—Health Committee. Accepted. Extension of the existing wireless apparatus at Hawkhead Hospital (£291).—Ewing & McIntosh.

Transport Committee. Accepted. L.c. cable.—Craigpark Electric Cable Co.; Standard Telephones. Feed pump for Pinkston power station.—G. and J. Weir, Ltd. E.h.v. switchgear for Pinkston station.—G.E.C. D.c. switchgear for Pinkston station.—Bertram Thomas. Underground indicator signs.—Simplex Electric Co.

Grimsby.—Estates Committee. Recommended. Rewiring at the Town Hall (£491).—L. Hancock.

Halifax.—Town Council. Accepted. Electrical work at thirty-six flats (£296).—Hall & Stinson, Ltd. Electrical work at 330 houses and fifty bungalows (£2,528).—J. R. Musgrave.

Ilford.—Electricity Committee. Accepted. Six 500-kVA transformers (£445 each).—Ferranti, Ltd.

Inverkeithing.—Town Council. Accepted. Electric lighting at fifty-six houses at Spittalfield Crescent.—T. S. Miller, Dunfermline.

Leek.—U.D.C. Recommended. Mercury arc rectifiers (£2,265) and e.h.v. switchgear and transformers (£2,239).—Electric Construction Co.

Liverpool.—Clarence Dock Power Station (Special) Committee. Recommended. Extensions to the coal-handling plant (£4,960).—Spencer (Melksham), Ltd. Three electrically driven boiler feed and lift pumps and three gland sealing pumps (£14,422).—Mather & Platt, Ltd. Boiler house lift (£943).—Austin Lifts, Ltd. Ash grab crane (£2,005).—R. Dempster & Sons. Modification of the ash-handling plant on the boilers to be installed at the Clarence Dock power station (£11,777) and pipes

and valves, &c., for two water-tube boilers (£19,230).—Babcock & Wilcox, Ltd.

Electric Power and Lighting Committee. Recommended. Six 250-kVA transformers (£143 each) and eighteen 750-kVA transformers (£296 each).—Electric Construction Co. 33,000-V cable, joint boxes, &c., for the extension of the h.v. mains from the Clarence Dock power station to the Marsh Lane sub-station (£48,383).—B.I. Cables, Ltd.

London.—L.C.C.—Accepted. Wiring and fittings for electric lighting, power, clocks and wireless, &c., at Block B of the Lambeth Hospital (£664).—Frank Angell & Co. This was the lowest of nine tenders, the highest being £986. Wiring and fittings for electric lighting, power, clocks, &c., at the Constance Road Institution (£559).—Smith & Hammond, Ltd. (Lowest of nine tenders, the highest being £889). Wiring and fittings for electric lighting, heating, &c., at the County secondary school, Bermondsey (£1,249).—Electrical Installations, Ltd. (Lowest of nine tenders, the highest being £1,530). Wiring and fittings for electric lighting and heating at Fox school, Kensington, S. (£447).—Smith & Hammond, Ltd. (Lowest of eleven tenders, the highest being £748.)

Housing and Public Health Committee. Recommended. Extension of existing contract for wiring and fittings for electric lighting, &c., in blocks 1, 2 and 7 of dwellings on the Tyers Street area, Lambeth, so as to include the electrical installations in blocks 3, 4, 5 and 6 of dwellings on the area (£1,511).—A. Meckhonik.

LEWISHAM.—Housing Committee. Electrical installation at 134 houses on the Grove Park estate :—

	£		£
Kirkdale Electrical Co. Recommended	**998**	J. H. Plant, Ltd.	1,317
Payne Bros.	1,091	H. W. Ingrey	1,432
E. Dyne & Co.	1,092	G. E. Taylor & Co.	1,436
A. J. Hewens & Sons	1,196	Pinchin & Walton	1,570

Recommended. Installation of fire points at 370 houses on the Grove Park estate (£388).—W. B. Bean. This was the lowest of nine tenders, the highest being £604.

Manchester.—Electricity Committee. Accepted. 6,600-V cable.—Derby Cables, Ltd. Supplies for twelve months: Electric kettles.—Premier Electric Heaters, Ltd.; Bulpitt & Sons. A.c. motors.—Crompton Parkinson, Ltd.; B.T.H.; Laurence, Scott & Electromotors, Ltd. Meters.—Ferranti, Ltd.; Met.-Vick. Electl. Co.; Measurement, Ltd. Time switches.—Venner Time Switches, Ltd. Street lighting columns.—Bromford Tube Co.; British Mannesmann Tube Co. Batteries, &c.—Siemens Electric Lamps & Supplies; G.E.C.

Middlesex.—County Council. Electrical installation at local County Offices, Brentford :—

	£		£
Alpha Manufacturing & Electrical Co.	825	Johnson & Tanner, Ltd. ...	1,015
Atozed., Ltd. Recommended ...	**901**	G. E. Thomas & Co.	1,030
G. A. Weston	901	S. Reed & Sons	1,053
Honor Bros.	902	Constable, Hart, & Co.	1,077
Bower Engineering Works, Ltd.	904	J. E. Swann & Co.	1,094
Holliday, Hall & Stinson, Ltd.	920	G. E. Wallis & Sons	1,132
Page & Girling, Ltd.	931	R. E. Robinson, Ltd.	1,175
Grensells	934	Caine Pernot, Ltd.	1,191
B. French, Ltd.	939	Fullick & Loosley, Ltd.	1,665

Salford.—Purchasing Committee. Accepted. Cable (£1,204).—Nederlandsche Kabelfabriek.

Sheffield.—Corporation. Accepted. Switchgear installations at sub-stations (£8,293).—A. Reyrolle & Co.

Stanhope (Co. DURHAM).—Parish Council. Accepted. Extension of the electric street lighting system at Frosterley and Cowshill, &c.—Overhead, Ltd.

Tredegar.—Town Council. Accepted. Plant for second part of the electricity supply scheme which includes houses in the West Ward, the Georgetown area, the Sirhowy district, and the whole of the lower portion of the town: E.h.v. switchgear.—Whitehead Switchgear Co. 250-kVA transformer.—Brush Elecl. Engg. Co. Mains.—Pirelli-General Cable Works, Ltd.

Wimbledon.—Electricity Committee. Accepted. L.v. cables during twelve months.—Telegraph Construction and Maintenance Co.

Windsor.—Town Council. Accepted. Variable speed motors for the waterworks (£2,315).—Harland Engineering Co.

Wolverhampton.—Electricity Committee. Accepted. Switchgear.—G.E.C. (£4,103); A. Reyrolle & Co. (£2,033).

Forthcoming Events

Institution of Electrical Engineers.—Wednesday, July 15th. Institution, London, W.C.2. Conversazione and reunion of members from overseas.

Transmission Section.—Friday, July 17th, to Monday, July 20th. Visit to France, including trips to Creney, near Troyes, and to St. Denis.

Royal Sanitary Institute Health Congress.—Monday, July 6th, to Saturday, July 11th. Southport.

Diesel Engine Users' Association.—Wednesday, July 8th. Loughborough. Summer meeting.

Electrical Contractors' Association.—Wednesday, July 8th, to Friday, July 10th. Folkestone. Annual conference.

Our Service Department

EVERY day inquiries of all kinds are received by the Editors, the bulk of them relating to the producers of specified classes of electrical goods. We are able to reply to most of these with the aid of our extensive records, but in a few cases we have to seek the assistance of our readers. This week we have been asked for the names and addresses of manufacturers of the following:—

LANCO switches.

Readers should enclose stamped addressed envelopes when making their inquiries.

Notes

Increasing Boiler Capacity

Two three-drum water-tube boilers, which were installed in 1920 at one of the I.C.I. power plants, have been reconstructed with a view to increasing the evaporative capacity of each from 28,000 lb. per hr. at 170 lb. per sq. in. to 60,000 lb. per hr. normal and 75,000 lb. maximum. In place of the original Underfeed Class "A" stokers of 177 sq. ft. grate surface designed to burn 18 lb. of coal per sq. ft. per hr., Underfeed "L" type stokers, each having a grate area of 196 sq. ft. and a rate of combustion of 43 lb. per sq. ft. per hr. at maximum load, have been installed. Side walls of 650 sq. ft. effective heating surface and an air heater, which will deliver air under forced draught at 123 deg. C., have been added. To increase the combustion chamber capacity, the boiler was lifted 5 ft. and the stoker lowered into the basement about 2 ft. Only one boiler at a time was available for reconstruction. Work on the first boiler was commenced on January 20th, and it was recommissioned on April 16th. Practically full load has already been attained without the use of preheated air. The stoker has been designed to burn a variety of coals with an average calorific value of about 11,000 B.th.u. per lb. The overhead bunkers have been divided so that separate chutes may deliver coal and riddlings on the sandwich system if required.

When lifting the boilers the drums were suspended from cross beams on the original setting, and temporary supports were passed under them. The original beams were removed, and the existing columns were extended by 5 ft. New beams were then fitted, through which rods were passed and secured to the temporary supporting transverse beams, square-threaded nuts being run on to these suspension rods to take the weight of the boiler. Hydraulic jacks were next placed at three points on the temporary beams, and the whole boiler was lifted. The load was followed up with the square-threaded nuts so that should the jacks fail the boiler would be held by the suspension rods. The total time required to lift each boiler, which weighed 90 tons, a height of 5 ft. was about 12 hr. The reconstruction was carried out by International Combustion, Ltd.

A.S.E.E. Visit

An interesting visit was paid on June 20th by the members of the Manchester Branch of the A.S.E.E. to the electrical and engineering plant of the Manchester Docks system. The visitors inspected the power plant which operates the Trafford Swing Bridge over the canal and the conveying and elevating plant, for the handling and storage of grain in bulk.

Exhibitions of Inventions

The twelfth International Exhibition of Inventions organised by the Institute of Patentees is to be held at the Central Hall, Westminster, from September 30th to October 10th. The Northern Exhibition of Inventions will take place at St. George's Drill Hall, Newcastle-upon-Tyne, from November 25th to December 5th.

Enamelled Copper Wire

Since the British Standard Specification for enamelled high-conductivity annealed copper wire was revised in 1932 further investigations have been made by the Electrical Research Association to determine the effect of voltage on the number of pinholes detected in enamelled wire. Certain detail modifications in the important pinhole test have been introduced and are incorporated in a new edition of B.S.S. 156, which is otherwise unchanged. Copies of the revised Specification may be obtained from the Publications Department, British Standards Institution, 28, Victoria Street, London, S.W.1, price 2s. 2d. post free.

Diesel Users' Summer Meeting

The summer meeting of the Diesel Engine Users' Association will take place at Loughborough on July 8th when inspections will be made of the generating station and engineering laboratories of Loughborough College and the works of the Brush Electrical Engineering Co., Ltd. Luncheon will be taken at the King's Head Hotel, and at the conclusion of the inspection of works, there will be a general meeting in the lecture theatre of Loughborough College.

Appointments Vacant

Electrical engineer and manager for the Milford Haven U.D.C.

Electrical clerk of the works for the Tottenham Education Committee.

Temporary electrical engineering assistants in the drawing office for the Air Ministry.

Showroom assistants and canvasser for Ilford Electricity Department.

Senior test room assistant for Port Elizabeth (South Africa) Electricity Department.

Assistant consumers' engineer for the Bromley Corporation.

Meter tester and repairer (mechanician) for Hove Electricity Department.

Scientific officer for the Air Ministry Scientific Research Pool.

Technical assistant (Distribution Department) for West Ham Electricity Department.

(See our classified advertisements.)

Our Personal Column

Electrical men are invited to keep readers of the "Electrical Review" posted concerning their movements

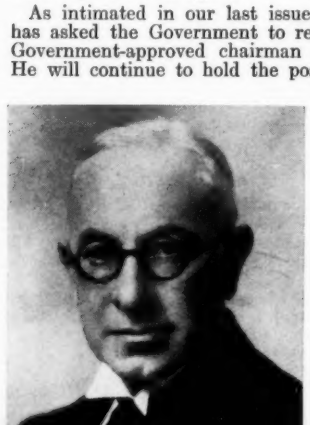
How keenly some of our well-known electrical men are interested in the Electrical Trades Benevolent Association is not such common knowledge as it ought to be. Apart from the fact that credit should always be fully given where it is justly due, there is the excellent lead or example that is set to others. From a recent list now before us we note that **Mr. Howard Marryat** has increased his subscription to £2,000, thus qualifying doubly for the class of patron of the Association, the minimum qualification being £1,000. We further see that **Mr. G. Balfour, Mr. J. Y. Fletcher** and **Mr. R. P. Sloan** have subscribed £500 apiece, thus qualifying as vice-patrons. There are various other items of interest in the list, but if we may jolt the reader over to another part of the Association's activities, let us add that bookings for the Electrical Industries Ball on November 24th next are already being made.

Mr. J. H. Bell, A.M.I.E.E., assistant superintending engineer in the London District of the Post Office Engineering Department, has recently retired, having reached the age of sixty. He gained his first engineering experience in the shipbuilding yards at Stockton-on-Tees and joined the National Telephone Co. in the same district in 1899. Three years later he transferred to the Post Office Engineering Department in London. During the war he was in charge of a cable ship with the Grand Fleet laying, testing and maintaining submarine cables for fleet communications. In 1926 he was promoted to executive engineer responsible for manual, trunk and automatic exchanges, including the London Repeater Station, Transatlantic Telephony Terminal, and other exchanges. He became assistant superintending engineer, London, in 1932, in charge of new exchange construction work. He has been closely associated with evening class lecture work, notably at the Polytechnic, Regent Street, W., Goldsmiths College, and the Borough Polytechnic. He is the inventor of a number of novel ideas and improvements in machine switching telephony.

Mr. J. H. Bell

Mr. P. S. Fowler, A.M.I.Mech.E., designer and chief draughtsman, and **Mr. T. H. W. Millie,** A.M.I.E.S., general works manager, have been appointed directors of Messrs. W. Sisson & Co., Ltd. Mr. Fowler has also been appointed secretary to the company.

As intimated in our last issue, **Mr. J. C. Denison-Pender** has asked the Government to relieve him of the position of Government-approved chairman of Cable & Wireless, Ltd. He will continue to hold the position of governor and managing director of the controlling company, Cable & Wireless (Holding), Ltd. He still holds the position of chairman of associated and subsidiary companies within the group, and is also chairman of the Cables Investment Trust, Ltd., the Marconi International Marine Communication Co., Ltd., and the Marconi Sounding Device Co., Ltd. **Sir Norman Leslie** has tendered his resignation, which the Court has accepted with regret. With the approval of the Government the Court of Directors has elected **Mr. E. Wilshaw** to be chairman and sole managing director of Cable & Wireless, Ltd. Since the merger of the British cable and wireless communications interests in 1929, Mr. Wilshaw has held the positions of general manager and secretary, chief general manager, with a seat on the board, and later managing director of Cable & Wireless, Ltd., in which capacities he has played a leading part in adjusting that organisation. He is also a director of Marconi's Wireless Telegraph Co., Ltd., and other companies associated with the group.



[Hughes, London

Mr. E. Wilshaw

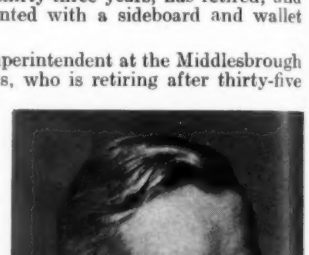
Colonel A. P. Pyne, A.M.Inst.C.E., M.I.E.E., formerly with Messrs. Johnson & Phillips, Ltd., has joined the staff of Ismay Cables, Ltd., of Dagenham, as chief engineer and works manager. **Mr. W. R. Hall,** 24, Victoria Buildings, Manchester, formerly with Derby Cables, Ltd., is now representing Ismay Cables, Ltd., in Lancashire, Yorkshire, Cheshire and North Wales.

Mr. C. L. Brown, 1a, Lennox Road South, Southsea, has been appointed sole agent for the South of England for the Cressall Manufacturing Co., Ltd., covering Sussex, Hampshire, and the Isle of Wight.

Mr. W. T. Halcrow, M.Inst.C.E., has been elected chairman of the Committee of the Association of Consulting Engineers for 1936-37. As reported on p. 10, **Mr. A. H. Dykes** is relinquishing the position of hon. secretary owing to ill-health.

Mr. E. J. Burton, who has been with the Norwich Corporation Electricity Department for thirty-three years, has retired, and on June 26th he was presented with a sideboard and wallet of notes by his colleagues.

Mr. J. Shaw, mechanical superintendent at the Middlesbrough Corporation electricity works, who is retiring after thirty-five years' service with the undertaking was presented on June 26th with an oak Westminster chiming clock. A gold wristlet watch was also handed to Mrs. Shaw. Mr. H. Haigh, the borough electrical engineer presided at the presentation, which was made by Mr. G. Moss, mains superintendent, the member of the staff with the longest service.



[Howard Coster

Mr. Frank Parkinson, whose gift to Leeds University is referred to on page 2 of this issue

Mr. H. V. Field, head of the Electrical Engineering Department of the Rutherford Technical College, Newcastle-on-Tyne, has been appointed principal of the Constantine Technical College, Middlesbrough.

Mr. A. D. Campbell, recently with Standard Telephones & Cables, Ltd., at North Woolwich has been appointed assistant to Mr. Mudd, London manager of British Electrical Repairs, Ltd.

Mr. S. E. Cawthra has been appointed as chief estimator of Bull Motors, and will have charge of the estimating department at the head office, Ipswich. Mr. Cawthra was formerly chief estimator at the London office of Lancashire Dynamo & Crypto, Ltd. **Mr. S. C. Middleton** has been appointed Midlands representative with headquarters in Birmingham. He was for nine years engineering representative at the Manchester branch of the General Electric Co., Ltd. **Mr. J. Helme,** who is in charge of sales in Yorkshire and the East Midlands, was formerly sales engineer in Toronto for the Leyland Motor Co. of Canada.

Mr. A. H. Law, M.A., M.Inst.C.E., M.I.E.E., is relinquishing his position as chief engineer to the English Electric Co., Ltd., in September, but remains in the service of the company as consulting engineer while being free to accept such other advisory work as does not conflict with his obligations to the company. Mr. Law was general manager of the Willans Works, Rugby, from 1926 to 1930, when he became chief engineer. **Mr. A. D. Sloan,** M.I.E.E., who is the chief a.c. designer of the English Electric Co., is to succeed Mr. Law as chief engineer.

Mr. A. D. Sloan

Mr. E. S. Riley, M.I.E.E., M.I.Mech.E., has been designated deputy borough electrical engineer by the Walthamstow Borough Council in its review of the grading of the staff of the electricity supply undertaking.

Obituary

Prof. W. E. Dalby.—The death occurred at Ealing on Thursday last week of Professor William Ernest Dalby, F.R.S., Emeritus Professor of Engineering in the University of London, at the age of seventy-two. He was an authority on the steam engine and was vice-president of the Institution of Civil Engineers, and hon. vice-president of the Institute of Naval Architects. He had also been Dean of the City and Guilds (Engineering) College.

Mr. Alexander Spencer, M.I.Mech.E., president of the Research Association of British Rubber Manufacturers, died on June 13th at the age of seventy-seven. He joined his father's business in 1880, and at the time of his death had completed fifty-six years' service with Messrs. George Spencer, Moulton & Co., Ltd., having been chairman during the last seventeen years. Numerous patents were taken out by him for a variety of inventions, chiefly in connection with the use of rubber by railways.

Mr. J. D. Smith, who died on June 17th, at the age of seventy-three years, was head of Messrs. J. Smith & Son, Ltd., electrical engineers, North St., Brighton. The business was established by his father, and it was converted into a limited company about nine years ago.

Financial Section

New Companies. Official Returns of Capital. Debenture Charges. Reports of Electrical Companies. Dividend Announcements. Transactions in Stocks and Shares

New Companies Registered

Ray-burn Electrics, Ltd.—Private company. Registered June 24th. Capital, £1,000 in £1 shares. Objects: To acquire the business of a manufacturer and assembler of electrical equipment for lighting, heating and other purposes carried on by P. G. Lambert at Hindsley Place, Forest Hill, S.E. The directors are: T. J. Robins, Woodroyd, Lansdown Road, Sidcup, P. G. Lambert, 9, Overhill Gardens, East Dulwich, S.E.22, and E. W. R. Ellis, 3, Devonshire Road, Palmers Green, N.13. Secretary: W. R. Ellis. Registered office: Hindsley Place, Forest Hill, S.E.23.

W. L. Martin Electric, Ltd.—Private company. Registered June 24th. Capital, £2,000 in £1 shares. Objects: To carry on the business of manufacturers and sellers of engineering and electrical machinery, &c. The subscribers are: B. Ogias, 26, Upper Berkeley Street, W.1, and H. O. Weatherby, 38, Longton Grove, Sydenham, S.E.26. Registered office: 16, Regent Street, S.W.1.

Sun-Lite Lamp Co., Ltd.—Private company. Registered June 23rd. Capital, £2,000. Objects: To carry on the business of mechanical, electrical and consulting engineers, manufacturers of electrical and mechanical appliances, &c. The directors are: J. D. Carlmark, 75, Bratt Street, West Bromwich, and two others. Secretary: H. D. Carlmark. Registered office: 10, Hardware Street, West Bromwich.

Joseph Adamson & Co., Ltd.—Private company. Registered June 26th. Nominal capital, £50,000. Objects: To carry on the business of electrical and mechanical engineers, &c. The permanent directors are: G. R. Adamson, Gower Hey, Kensington Street, Hyde, and J. Adamson, Streeton, Ladybrook Road, Cheadle, Hulme. Secretary (pro. tem): T. L. Massey. Solicitors: Walker & Ashworth, Spring Bank, New Mills, Derbyshire.

Orel Micro Electric, Ltd.—Private company. Registered June 26th. Capital, £500. Objects: To acquire the business of an electrical engineer and manufacturer and vendor of electrical appliances and gears of every kind carried on by E. Siegrist at Kern House, Kingsway, W.C., and at 39, Berners Street, W. The directors are: E. Siegrist, 2, Park Road, West Dulwich, S.E.21 (life chairman and managing director), and two others. Registered office: 39, Berners Street, W.

B. & B. Tate (1936), Ltd.—Private company. Registered June 27th. Capital, £1,000. Objects: To carry on the business of electrical, mechanical, domestic and radio engineers and contractors, sellers of articles pertaining thereto, &c. The directors are: C. L. Bunt (permanent director and chairman), and Mrs. M. J. Bunt, both of 2, Ascott Avenue, Ealing, W.5. Registered office: 31, Bond Street, Ealing, W.5.

Ensel Electric Co., Ltd.—Private company. Registered June 27th. Capital, £500. Objects: To carry on the business of manufacturers, agents for and dealers in incandescent and other electric lamps and electrical apparatus, &c. The permanent directors are: A. Ensel, 86, Carleton Road, N.7 (chairman and managing director), and two others.

Francis J. Mudford, Ltd.—Private company. Registered June 18th. Capital, £500. Objects: To acquire the business of F. E. Mudford and Mrs. A. M. Mudford, trading as Francis J. Mudford, and to carry on the business of electrical and mechanical engineers and manufacturers, electricians, &c. The directors are: F. E. Mudford, electrical engineer, and Mrs. Alice M. Mudford, both of 4, Jackson Road, Holloway, N.7. Registered office: 2, Jackson Road, Holloway, N.7.

Goldhawk Electric Co., Ltd.—Private company. Registered June 15th. Capital, £500. Objects: To carry on the business of electrical, mechanical and wireless engineers, designers, manufacturers, &c. The directors are: E. B. Smith, 2, Brunswick Gardens, Graystoke, Ealing, W.5, electrical engineer (permanent director and chairman); and E. A. Tilbrooke, 5, Twyford Abbey Road, Willesden, N.W.10. Registered office: 160/162, High Street, Acton, W.3.

Syntron Sales Co., Ltd.—Private company. Registered June 18th. Capital, £1,000. Objects: To carry on the business of manufacturers of and dealers in machinery, including electrical hammers and vibrators, electrically driven power machines of all kinds, &c. The subscribers are: G. E. Sanders, 16, Kingswood Road, Shortlands, Kent; and R. M. Lucas, 31, Brooksville Avenue, Brondesbury Park, N.W.6. Solicitors: Goulden Mesquita and Co., Mark Lane Station Buildings, E.C.3.

British Radio Electrics, Ltd.—Private company. Registered June 24th. Capital, £2,500. Objects: To carry on the business of manufacturers of wireless components and apparatus, electrical and scientific instruments and parts, &c. The subscribers are: C. Hyams, Torbay Mansions, N.W.6, and E. Hammond, Ross Cottage, Feltham, Middlesex. Secretary: C. Hyams.

Returns of Electrical Companies

English Electric Co., Ltd.—(A) Debenture, dated June 13th, 1936, to secure £350,000, charged on all instalments and sums payable to the company by the Polish State Railways, under contract dated August 2nd, 1933, for the electrification of certain railways in and around Warsaw (except such part thereof as the company has agreed to sell to the British and Foreign Utilities Development Corporation), together with the benefit of a guarantee by the Export Credits Guarantee Department (subject to trust deeds dated September 15th, 1919, and August 14th, 1923, and deeds supplemental thereto). (B) Debenture, of same date, to secure £200,000, charged on the company's undertaking and property, present and future, including uncalled capital, but excluding the benefit of the 1933 contract (subject to the trust deed dated September 15th, 1919, as modified by supplemental deed dated June 17th, 1930, but ranking in priority to the trust deed of August 14th, 1923, as modified by supplemental deed dated June 17th, 1930, and to the floating charge created by the trust deed dated May 7th, 1936). Holders: Lloyds Bank City Offices Nominees, Ltd.

Artic Fuse & Electrical Manufacturing Co., Ltd.—Capital, £5,000 in 4,700 ordinary and 100 deferred ordinary shares of £1 and 4,000 founders' shares of 1s. Return dated December 31st, 1935 (filed March 20th, 1936). 2,683 ordinary, 100 deferred ordinary, and 2,183 founders' shares taken up. £2,079 13s. paid on 1,983 ordinary and 1,983 founders' shares, £312 10s. considered as paid on 700 ordinary, 100 deferred ordinary, and 250 founders' shares. Mortgages and charges, nil.

Newton Brothers (Derby), Ltd. (formerly Haslam & Newton, Ltd.).—Satisfaction to the extent of £15,000 on May 17th, 1936, of debenture dated October 25th, 1929, and registered October 29th, 1929, securing £75,000.

Northern Batteries, Ltd. (formerly Watson & Henderson, Ltd.).—J. Miller, 18, Market Street, Newcastle-on-Tyne, ceased to act as receiver on June 11th.

Cheshire Cables, Ltd.—H. Longrigg, 1, Dickinson Street, Manchester, was appointed receiver on June 11th, under powers contained in debenture dated January 6th, 1936.

Electrical Distribution of Yorkshire, Ltd.—Capital, £2,200,000 in £700,000 6 per cent. cumulative preference stock and £1,500,000 ordinary stock. Return dated March 10th, 1936. All stock taken up. £2,200,000 paid. Mortgages and charges, nil.

Borth and Ynyslas Electric Supply Co., Ltd.—Capital, £7,000 in £1 shares. Return dated April 4th, 1936. 4,280 shares taken up. £4,280 paid. Mortgages and charges: £1,940.

Watford Electric and Manufacturing Co., Ltd.—Satisfaction to the further extent of £1,500 on May 31st of debentures authorised May 31st, 1923, and registered June 11th, 1923.

Automatic Light Control, Ltd.—G. C. Jarvis, 115/117, Cannon Street, E.C.4, ceased to act as receiver on June 10th.

Elven Mains Manufacturing Co., Ltd.—Capital, £200 in £1 shares. Return dated July 29th, 1935 (filed May 6th, 1936). £152 shares taken up. £152 paid. Mortgages and charges, nil.

Conway James & Co., Ltd.—Particulars filed of £400 debentures, authorised June 17th, 1936, charged on the company's undertaking and property, present and future, including uncalled capital, the whole amount being now issued.

Switchit Service, Ltd.—Debenture, dated June 10th, 1936, to secure £400, charged on the company's undertaking and property, including uncalled capital. Holders: Philco Southern Distributors, Ltd., Garlands Road, Redhill, Surrey.

Solidite and Synthetic Mouldings, Ltd.—S. E. Smith, of 4, Broad Street Place, E.C.2, ceased to act as receiver and manager on June 5th, 1936.

Concerton Radio & Electrical Co., Ltd.—Capital, £5,000 in £1 shares. Return dated December 31st, 1935 (filed January 16th, 1936). 2,000 shares taken up. £2,000 paid. Mortgages and charges, nil.

Escott Bros., Ltd.—Satisfaction to the extent of £700 on March 14th, 1936, of mortgage registered July 26th, 1935. (Notice filed June 6th,)

Erdington Electrical Co., Ltd.—Capital, £2,000 in £1 shares. Return dated April 26th, 1935 (filed May 18th, 1936). 1,000 shares taken up. £1,000 paid. Mortgages and charges, nil.

E. R. Morton, Ltd.—Capital, £1,000 in £1 shares. Return dated November 12th, 1935 (filed May 21st, 1936). 502 shares taken up. £502 paid. Mortgages and charges, nil.

Allenby & Stokell (Birmingham), Ltd.—Capital, £800 in £1 shares. Return dated December 14th, 1935 (filed May 27th, 1936). All shares taken up. £800 paid. Mortgages and charges, nil.

City Notes

The General Electric Co., Ltd., held its annual meeting on June 25th, Lord Hirst (chairman and managing director) presiding. In presenting the report and accounts (ELECTRICAL REVIEW, June 19th, p. 925) the chairman said that the good results were due to a number of causes. During the depression they had carried on research and development work so that they were in a position to take full advantage of the recovery in business which was now evident. He saw no reason why, given political stability and peace in the industry, equally good, if not better, results should be obtained. Their main activities had been in the home market, but they had made considerable progress during the last year in the supply to overseas countries. The increase in their export business was about 20 per cent. The volume was a record for the company, though the actual money value fell a little short of the year 1929-30, when prices were considerably higher. The increase was mainly due to exports to the British Empire, which now absorbed over 75 per cent. of their overseas shipments. If there were peace in the world, industry and trade within the Empire would proceed from strength to strength, and he believed that peace would continue to prevail for many years to come.

With regard to the past year's activities, the Fraser & Chalmers works had been very busy. Activity in the gold mining industry had brought a number of satisfactory orders for mining equipments. Their Chance coal washing plant had already been adopted by a dozen mining companies, and promised good business for the future. Rolling mill equipment, conveying plant and other important mechanical orders had also contributed towards keeping these works fully employed for the past year and for some time to come. The increased activity reported last year in the heavy engineering workshops at Witton had been well maintained, and the number of employés at these works had risen to 8,000. Striking advances had been made in several directions. The first installation of pumpless air-cooled mercury arc rectifiers for the London Passenger Transport Board had been at work for some time, and a number of other orders had been received since.

Their high power test laboratory at Witton represented the latest type of equipment of this character in the world. For some time it had been evident that the rated rupturing capacity of circuit-breakers should be guaranteed by adequate testing. They were now in a position to give such a guarantee. The plant included one of the largest generators they had ever built which was capable of giving a normal short-circuit output of two million kVA at any commercial voltage up to 22,000, the complete plant providing these facilities up to 132,000 V. Amongst many orders for turbo-alternators received during the year was that for a third 62,000-kVA generator for the Hams Hall power station, Birmingham. This was the sixth set supplied by them to this station, making a total of 300,000 kVA. A further 30,000 kVA turbo set had been ordered by the Johannesburg Municipality, bringing the total capacity there up to 120,000 kVA. The new set would generate at 20,000 V. A number of sets had also been sent to India, Canada, Australia and South America. Other orders of special interest included a large number of rolling mill equipments, amongst them being plant for Dorman Long, in which was included one of the largest motors ever built in this country with a maximum peak output of 20,500 h.p. A large number of electrical winder equipments had been supplied to mining companies in South Africa.

Their position in connection with railway electrification had been well maintained, and a number of orders had been received from the London Passenger Transport Board. Large orders for trolley bus equipments had been received from London and provincial authorities and abroad. They had received further orders for Diesel-electric tugs. The field of communication had seen further development and expansion and their telephone works had received their full share of all this work. The telephone equipment for the *Queen Mary* was installed by their Coventry works, and they were responsible also for the lighting of practically all the public rooms in that liner. The development of the system whereby a number of speech channels could be transmitted over a single conductor by means of carrier currents of differing frequencies was now beginning to take commercial form and the Post Office was trying new cables between certain centres which were to be equipped with apparatus providing twelve speech channels per pair of conductors, and the G.E.C. was to receive the order for the terminal equipment and the new cable between London and Cambridge. As many as two hundred channels over a special conductor of novel design had been obtained in an experimental way. This design of cable would be made at the Pirelli-General works. With regard to television they were ready with their receivers immediately transmissions commenced.

They had made great progress in the field of illumination. The most important development during the year had been the study of aerodrome lighting, and they had received a number of contracts for this from home and abroad, the Indian Government alone having entrusted them with the lighting of twelve aerodromes from Karachi to Rangoon. To-day about 1,400 miles of roads were lighted by "Osira" lamps, which were also being used for industrial lighting. In heating and cooking they had considerably extended their activities. They had recently installed at the Pirelli-General Cable Works their own rolling mill, and that company had developed a new lead extrusion machine, one of which had been in constant operation in their own factory for the past two years. They were also constructing several of these machines for other cable makers. The demand for oil-filled cables was increasing. Their utility companies were doing well and they had entered the dividend-earning stage. All these activities had given employment to 4,000 or 5,000 additional workers and the total number of employés now exceeded 34,000.

At the close of the meeting an extraordinary general meeting was held at which resolutions were passed removing the restrictions on British ordinary shares and authorising the conversion of all shares into stock.

Callender's Cable & Construction Co., Ltd.—A satisfactory year's trading and a promising outlook for 1936 were reported by the chairman of the company, Sir Fortescue Flannery, at last Wednesday's annual general meeting. The company, he said, had enjoyed its share of the general improvement in trade during the last eighteen months and had earned substantial profits. One of the principal mainstays of the business at home was the system of regular contacts made with substantial buyers annually for their supplies and there had been a gratifying renewal in this respect. Referring to competition in cable making, Sir Fortescue said that it was as well to bear in mind that the company's income was not entirely obtained from its manufacturing and sales. It had very large investments, some in similar manufacturing concerns, but a still larger amount in electric power undertakings which, besides providing a useful outlet for the company's manufactures, contributed a substantial proportion of the profits. In addition, they had interests in companies carrying on industries supplemental to their own, such as copper refining. The chairman uttered a word of warning to those who might feel disposed to rush into the cable-making industry, and, by cutting prices, secure a profitable return. The business of Callender's and other great cable companies had been built up by the reliability of their manufactures and by the service which they gave. The situation to-day, with English cables prominent in the world for their reliability, had not been achieved without heavy expenditure in research, and the company's own research and proving establishment at Wood Lane was one of the largest, best equipped and most up-to-date organisations in the industry. During the past eighteen months a very thorough reconditioning and extension of the buildings and plant had been carried out at the Anchor Works, Leigh, where the rubber-insulated cables were manufactured. When this reconditioning was complete in a few months' time they would be in a position to deal with a larger output than hitherto, at a substantial reduction in cost, and with a greater capacity for rapid delivery. It was at that factory that 650 miles of cables for the "Queen Mary" were manufactured, and he was confident that they might expect in the future a very important development of their trade for marine construction. They also manufactured cables for airplanes, that in which Mrs. Mollison obtained her record flight to and from the Cape being wired with the company's cables. The working efficiency of the company had been substantially improved by the development in the management of the factories, and to enable the directors to have a closer personal contact with Mr. George Barnard, the company's district engineer in the Midlands, who had been in the company's service for over fifty years, they had appointed him advisory director. Referring to the financial position of the company, Sir Fortescue said that the increase of £120,000 in the gross profits was spread generally over the business of the company, both on the manufacturing and the contracts side, and on the investment side. In recommending the payment of a dividend of 15 per cent. for the seventeenth successive year and the carrying forward of £390,234 (an increase of approximately £84,000), the directors had considered that the present position of international relationships necessitated the maintenance of funds in as liquid a position as possible. All the subsidiary companies in this country had made a profit. For the first five months of the year trading had improved on 1935 and the output of the works in May was a record. The chairman concluded by moving the adoption of the report and accounts. Seconding, Sir Tom O. Callender, deputy chairman and managing director, reviewed the company's successes in India, South Africa, Australia and New Zealand, and stated that as a result of the successful undertaking of the Uhl River work they had recently been in touch with the Madras Government, where large contracts had been completed by the company, and new work was well on the way. Owing to the increase in Japanese competition in China they were considering whether they should not make a complete clearance of their offices in that country as other firms had already found it necessary to do. Continental business was only of small volume at present on account of the conditions of trade. In conclusion, Sir Tom recorded his appreciation of the services of Messrs. Charles Pipkin and P. V. Hunter. The report and accounts were adopted unanimously, and a resolution was passed approving the conversion of ordinary and preference shares into stock.

The Revo Electric Co., Ltd., held its annual meeting on June 24th, when Mr. Bertram Silcock (chairman), who presided, said that Mr. Ernest Vaughan, while still retaining his position as a director, had desired to relinquish his duties as chairman, and the board had appointed him (Mr. Silcock) to the position. The chairman then briefly surveyed the scope of the company's productions and said that the sales for the year under review were larger than those of the previous year and it was hoped that under normal conditions the expansion would continue. With this object in view the factory was to be extended and extra plant installed as the present works were now running to capacity. With regard to the future, at the moment there was no sign of any diminution of electrical development. In the manufacture of heating and illumination plant and equipment the company had taken its part in the past and was well placed to do so to an increasing degree in the future, and in the development of electric traction, wireless communication and the illumination and signposting of streets and roads, there was illimitable scope for the industry for years to come. The turnover of the company was increasing and the order book was satisfactory in spite of keen competition. The Ministry of Transport's scheme for the adequate lighting of all roads pointed to a period of activity in that branch of their business. In the domestic electrical appliance section the turnover was growing every year and with the retention of the management, Mr. Reeves, Mr. Felton and Mr. Barrow, they could reasonably hope for a continuance of its progressive results.

The Lisbon Electric Tramways, Ltd., held its annual meeting on June 24th, when Lt.-Col. V. Vivian, who presided in the absence of Mr. F. W. Kerr (chairman), in reading the speech prepared by Mr. Kerr, said that the traffic returns showed that during the period under review 121,810,659 passengers had been carried, as compared with 120,534,321 in the pre-

ceding year, an increase of 1,275,338. During the first few months of the current year, despite bad weather, the passenger traffic had been well maintained due, to a certain extent, to the fifteen new passenger cars recently put into service, part of the new construction programme for thirty new cars which was commenced last year. The capital expenditure programme at present in view still involved £100,000, which covered the new rolling stock mentioned and further car shed accommodation, extensions of track, &c. The work entailed would be undertaken as far as possible in the current year. A further programme of track construction and car building to meet possible requirements over the next four or five years was under consideration, while there was still in progress a scheme for substituting open type cross-bench cars by modern closed bodies. Conditions in Portugal were satisfactory and their relations with the Government continued on a friendly basis.

Philco Radio & Television Corporation of Great Britain, Ltd.—The lists opened on Wednesday last in an offer for sale of 250,000 6 per cent. redeemable cumulative preference shares of £1 each at 21s. per share and 175,000 ordinary shares of 2s. each at 6s. 6d. per share. The company carries on business at Perivale, Middlesex, as manufacturers of radio receivers and components. It has also acquired the benefit in Great Britain of all present and future patents, designs, and processes relating to the manufacture of radio and television receivers, valves and components owned or controlled by the Philadelphia Storage Battery Co., the owner in the United States of the trade mark "Philco." It is stated that the periods prior to June 30th, 1935, before the erection of the new factory, do not afford any indication of the earning capacity of the present undertaking. The profits for the last six months of 1935 were sufficient to cover the dividend on the preference shares now offered over three and a half times, leaving a balance equal to over 40 per cent. on the ordinary shares. It is estimated that the profits for the year ending December 31st next should not be less than £100,000.

The Watford Electric & Manufacturing Co., Ltd.—Particulars of this company were published on Friday last for information only. The company was formed on June 24th with a capital of £100,000 in 100,000 6 per cent. cumulative preference shares of 10s. each and 500,000 ordinary shares of 2s. each, the issued capital being £85,000. Its objects are to acquire as a going concern as from January 1st last the business of automatic electric control and switchgear manufacturers carried on by a private company of the same name founded in 1908. The purchase consideration is £75,500, payable as to £48,500 in cash and £27,000 by the allotment to the vendor company or its nominees of 270,000 2s. ordinary shares. The remaining 180,000 ordinary shares have been privately placed through Messrs. Foster & Braithwaite, together with 80,000 preference shares, at 2s. 6d. and par respectively. The profits during the past four years have risen from £6,600 to £15,800, and for 1935, after providing for income tax, directors' fees, &c., there is a sum of about £10,000 net available.

John Ismay & Sons, Ltd., held their annual meeting on June 26th, when Mr. J. Ismay (chairman and managing director) said that they were now interested principally in their main business of lamp manufacturing at Ilford. The profits from this line had been satisfactory as, although mantles had been rather disappointing and had shown a decrease, this had been more than offset by the sales of lamps, which had shown a big expansion. Although they increased their productive capacity at Ilford during the past year, they found that they would have to do so again this year, and plans for the new buildings were already in hand. Their export trade in lamps showed satisfactory growth, and he was confident that their export sales this year would total close on a million lamps. Competition was keener, but any reduction in profits from this cause would be more than made up by their increased turnover and economies in working, and he saw no reason why the current year should not show at least as good results. Their new daylight lamp had aroused great interest.

The Globe Telegraph & Trust Co., Ltd.—Presiding at the annual meeting held on Tuesday last, the Earl of Midleton (chairman) said that the year under review had been rendered exceptional by the repayment of £1,608,691 by Cable & Wireless (Holding), Ltd., in respect of that amount of the Trust's holding in 5½ per cent. preference stock. Communication companies overseas had not been so fortunate in recent years as Cable & Wireless, but on the other hand the Western Union Telegraph Co. had resumed payment of dividends (2 per cent.) and there was hope of a bigger distribution in the coming year. In October last the Trust's petition for wider powers of investment was granted, which had enabled it to acquire interests in various undertakings connected with transport and other industries. In view of the new investments they had felt justified in making the additions to the interim dividends on the ordinary shares.

Aron Electricity Meter, Ltd., reports a net profit for the year ended March 31st last of £42,116, as compared with £44,349 for 1934-35. This is subject to a charge of £11,215 for income tax on the profits of the preceding year. The directors have applied £1,374 to writing off certain special items, and have utilised £5,000 to create a further reserve for the purpose of equalising income tax charges, bringing this fund up to £10,000. The dividend for the year on the ordinary shares is maintained at 15 per cent., by a final distribution of 10 per cent., and £11,347 is carried forward. The report states that the meter business of the company in England continues to be satisfactory. The company has been fully indemnified for the loss caused by the fire which occurred at its Salusbury Road works. Meeting: July 13th.

Ward & Goldstone, Ltd.—Presiding at the annual meeting on June 24th, Mr. M. H. Goldstone (chairman) said that the costs of raw materials and wages had advanced and competition was more severe than in past years. Only by continued striving to increase efficiency and to maintain a high standard of quality, combined with the development and the introduction of inventions and new productions were they able to maintain their progress. The new buildings which had been erected were occupied during the latter part of the year. They provided new engineering and carpenters' works, stores, manufacturing departments, and a canteen. They had in hand for the current year an ambitious programme which they hoped to have completed by the late autumn, including large new buildings. Additional plant had been ordered and they hoped by the introduction of new lines to compensate for the keen price-cutting in many of the goods in regular demand.

The Atlas Electric & General Trust reports that interest, dividends, and other receipts for the year ended March 31st last, after taxation, amounted to £215,017 (against £207,068 for 1934-35), to which is added £3,556, being income tax recovered in respect of previous years. After meeting debenture interest, &c., there is a credit balance of £165,198, which with £15,449 brought in makes £180,647. The preference dividend absorbs £163,437 and £17,210 is carried forward. The last ordinary dividend was for 1931-32.

The Electrical Finance & Securities Co., Ltd., reports a profit for 1935, after deducting debenture and other interest, &c., of £33,620, as compared with £32,763, to which is added £21,797 brought in, making £55,418. The final ordinary dividend is 5 per cent., and a bonus of 2½ per cent. maintains the distribution for the year at 12½ per cent.; £28,115 is carried forward.

Increases of Capital.—The nominal capital of the following companies has recently been increased to the extent shown:—Philco Radio & Television Corporation of Great Britain, Ltd., from £100 to £450,000; Scophony, Ltd., from £140,000 to £300,000; Underwood (Manchester), Ltd., from £3,000 to £6,102; C. & R. Research, Ltd., from £2,025 to £6,025.

The Lancashire Dynamo & Crypto, Ltd., has decided to repay the £40,700 of 5 per cent. first mortgage debentures, reserving the power to reissue the debentures at its discretion. Since the repayment will take place prior to June 30th, 1954, the date fixed in the trust deed, a bonus of 3 per cent. becomes payable. Holdings will accordingly be repaid on December 31st next at the rate of £103 for each £100 debenture.

Greenwood & Batley, Ltd., report a profit for the year ended March 31st last of £46,300, as compared with £45,109 in the preceding year, to which is added £19,843 brought in, making £66,143. After deducting debenture interest, providing £12,000 for depreciation, &c., it is proposed to pay an ordinary dividend for the year of 4½ per cent. (against 4 per cent.), and to carry forward £22,222. Meeting: July 9th.

Richardsons Westgarth & Co.—Presiding at the annual meeting of the company held on June 30th, Mr. R. S. Middleton (chairman) said that the company was sadly in need of working capital. The indebtedness to the bank was £200,000, and no depreciation had been written off for nine years. The directors were preparing a scheme of financial reconstruction.

The Bagdad Light & Power Co. reports a net profit for 1935 of £22,779, as compared with £21,515 in the preceding year, to which is added £6,861 brought in. The ordinary dividend for the year is 2½ per cent., tax free (against 2 per cent.), and £7,141 is carried forward.

The Woking Electric Supply Co., Ltd., proposes to make a bonus issue of fully paid £1 ordinary shares in the proportion of one for each ordinary share held. The necessary resolutions will be considered at a meeting on July 14th.

Chadburn's (Ship) Telegraph Co., Ltd., has announced a dividend of 4 per cent. for the year ended March 31st last (against nil).

Allen West & Co., Ltd., held an extraordinary meeting on June 24th, at which the scheme for capital reconstruction was approved.

The Great Northern Telegraph Co. is maintaining its interim dividend at 2½ per cent.

Stocks and Shares

TUESDAY EVENING.

THE first half of the calendar year ending to-day—Tuesday—has brought a considerable amount of business to the Stock Exchange. During the period political and financial crises have followed one another so closely as to give rise to the jest that nowadays the international position could scarcely be called normal unless there were a crisis on hand. Several outstanding features call for notice: First, the continued cheapness of money; secondly, the remarkable manner in which home industries have gone ahead, as evidenced by the expansion in profits and the quickening of trade channels throughout the length and breadth of this country. The United States has been going through a troublous time. Continental affairs have been anything but encouraging to the investment of money outside this country. These two factors have had a good deal to do with the concentration of attention upon home industries where, as already mentioned, profits have shown substantial expansion, and are likely to increase still further, so far as can be seen at present. It is quite true to say that the position at home is less settled than could be wished. Labour demands occasionally raise their heads, in the railway and other industries, but notwithstanding these, the investor and the speculative investor are alike purchasing industrial shares up to price levels that show very modest returns upon capital invested in them at the current quotations.

The McGowan Report

The McGowan Report aroused, it is hardly necessary to say, lively interest in those Stock Exchange markets where electricity supply securities are negotiated and towards which the

attention of investment has been turned in order to observe the reaction of stocks and shares to the report of the McGowan Committee. Reference to the price lists will show that the actual changes are negligible. In the Stock Exchange market the view is taken that several years will have to elapse before any definite action is likely to be taken, and that the companies affected by the report are likely to make such arrangements between themselves as will have the effect of neutralising whatever shall happen in the future. Opinion is general that the latter-day disposition of electricity supply undertakings to link up and to form concrete groups out of separate units will be carried further and that, if the report of the Committee should be put into practical operation, the previously arranged agreements and amalgamations will leave the undertakings more or less unchanged. Last year's comprehensive amalgamation of the leading London electricity supply companies holds a hint as to what may be expected to happen in the future. It is considered probable that the tendency of the next few years, under the stimulus of the McGowan Report, will continue in the same stimulus but perhaps rather more quickly.

The market is satisfied that the proposals would be of benefit to the supply companies as a whole and their shareholders. The view is less clear when viewed from the particular as opposed to the general angle, particularly where the holding companies are concerned. The effect on the latter of compulsory amalgamation with their subsidiaries, and of a close supervision of their affairs, is uncertain; different companies would be affected in different ways.

As regards the smaller supply companies—whose utility is heavily criticised in the report—financial details of their proposed absorption by the larger concerns are rather sketchy, but are criticised on the grounds of unfairly handicapping those companies which have allowed for depreciation on sound lines.

Cable and Wireless

Cheerfulness was renewed in Cable and Wireless (holding) stocks when the statement from Electra House set official seal upon reports, which have been current for a week or so, regarding changes in the Cable and Wireless board. Investors are apparently prepared to overlook the unsatisfactory trend of traffics indices in recent months in favour of the promised re-examination of the Cable and Wireless position by the Empire Governments. No one can tell, of course, what steps will be taken to strengthen the strategic importance of the Empire communication system, or in what way the holding company's stockholders will be involved. That a hopeful view is taken of the expected reforms is, however, shown by gains of 2 points to 104 in the price of the preference stock, and of marked appreciation in the "A" and "B" ordinary stock quotations.

Electrical Equipment and Manufacturing

Newcomers to the electrical equipment market are the 2s. ordinary and 10s. preference shares of the Watford Electric and Manufacturing Company, particulars of which were recently made public. The company is old established, and its profits in 1935 were sufficient to cover the payment of the dividend on the issued 6 per cent. cumulative preference shares more than four times over, leaving a balance equivalent to approximately 17 per cent. on the ordinary shares. The ordinary are quoted at 3s. 6d. and the preference at 10s. 3d. The yield on the latter works out at 5.8 per cent.

A jump of half-a-sovereign in the irrepressible Crompton Parkinsons is the brightest spot in a generally cheerful market for electrical equipment shares. Buyers of Cromptons already have an eye on the end of the company's current year; it is believed that earnings are running at a level high enough to provide for a distribution at least equal to last year's, although the ordinary capital has been rather more than doubled. In the cable group, Callenders and British Insulated are up by $\frac{1}{16}$ and $\frac{1}{8}$ respectively; Henleys fully maintain their recent rise. English Electric issues are well to the fore with rises of 2s. in the ordinary to 23s., and of 1s. 9d. in the preference to 27s. Electric Constructions put on $\frac{1}{16}$ to $1\frac{1}{16}$. Higher prices are ruling for Ever Ready shares and Associated Electricals. Among telephone manufacturing shares, Halls spurted 3s. to 23s. 6d. on the offer of new shares to shareholders on bonus terms. Ericssons gained $\frac{1}{16}$ to $2\frac{5}{16}$, and Telegraph Condensers $\frac{3}{16}$ to 2. Telephone Manufacturing are firm at 9s. 6d., the new shares being 2s. 3d. premium.

Miscellaneous Matters

After rising from 7s. 6d. to 10s. on hopes of a reprieve from the Ullswater Committee's recommendations for State control of the broadcast relay exchanges, Broadcast Relay Services fell back again to 7s. 6d. upon publication of the White Paper. The anticipated reprieve has turned out to be no better than a three-year respite. Shareholders can scarcely regard the position as anything but unsatisfactory: many go further, and criticise the justice of the proposals.

Babcock & Wilcox have been a better market. British Aluminiums are up to £2. Tube Investments, with a rise to $3\frac{1}{16}$ have gained 6s. 3d. in the past fortnight. International Combustions eased off to 95s. The rubber share market has taken a turn for the better. Stock Exchange business can be aptly described, at the present time, in the classical phrase associated with the curate's egg.

Share List of Electrical Companies

HOME ELECTRICITY COMPANIES.

	Nom.	Dividend. Previous.	Dividend. Last.	Price. June 30.	Rise or Fall.	Yield p.c. £ s. d.
Bournemouth and Poole	1	15	15	77/6	—	3 17 5
City of London	1	7½	7½	37/–	—	4 1 1
Clyde Valley	1	7	8	45/–	—	3 11 1
County of London	1	10½	10½	55/6	–6d.	3 15 10
Edmundson's 7% Pref.	1	7	7	35/–	—	4 0 0
Do. Ord.	1	8	8	43/–	—	3 14 5
Elec. Dis. Yorkshire	1	9	9	48/6	—	3 14 3
Elec. Fin. and Securities	1	12½	12½	3⅛	—	3 15 5
Elec. Supply Corporation	1	11	11	62/–	—	3 11 0
Lancs Light and Power	1	7½	7½	38/6	—	3 18 0
Lond. Assoc. Electric	1	—	7	35/–	—	4 0 0
London Electric	1	7	8	39/–	—	4 2 1
London Power Deb. Red.	Stock	5	5	108½	—	4 12 2
Metropolitan	1	10	10	51/6	—	3 17 7
Midland Counties	1	7	7½	41/–	—	3 13 2
Mid. Elec. Power	1	8	8	43/9	—	3 13 2
North Eastern Electric Ordinary	1	6	6	34/–	—	3 10 7
Do. 7% Pref.	1	7	7	35/6	—	3 19 9
Northampton	1	10	10	53/9	—	3 14 5
Notting Hill 6% Pref.	10	6	6	14½	—	4 4 3
North Met. Elec. Ordinary	1	10	10	58/9	—	3 8 0
Do. do. 6% Pref.	1	6	6	32/–	—	3 15 0
Scottish Power	1	8	8	43/–	—	3 14 5
South London	1	7	7	34/6	—	4 1 2
Whitehall Elec. Invst. 7½% Pref.	1	7½	7½	21/–	—	7 2 10
Yorkshire Elec.	1	8	8	45/6	—	3 10 4

PUBLIC BOARDS.

Central Electricity, 1950–70	Stock	5	5	118	—	4 4 9
Do. 1955–75	,,	5	5	120	—	4 3 4
Do. 1951–73	,,	4½	4½	111	—	4 1 1
Do. 1963–93	,,	—	3½	101	—	3 9 4
London Elec. Trans. Gtd.	,,	—	2½	96	–½	2 12 1
London & Home Counties, 1955–75	,,	4½	4½	115	—	3 18 3
London Passenger Transport, A.	,,	—	4½	122½	–1	3 13 6
Do. do. B.	,,	—	5	127	—	3 18 9
Do. do. C.	,,	3½	4	103	+1	3 17 8
West Midlands Joint Elec. 1948–68	,,	—	5	116½	—	4 5 10

TELEGRAPH AND TELEPHONE.

American Tel. & Tel.	$100	9	9	162½	–5	5 10 9
Anglo-Am. Tel. Pref.	Stock	6	6	128½	+1	4 13 5
Do. Def.	,,	1½	1½	31	+1	4 16 9
Cable & Wireless 5½% Pref.	,,	4½	5½	104	+2	5 5 10
Do. A. 7½% Ord.	,,	Nil	Nil	23	+1½	—
Do. B. Ord.	,,	Nil	Nil	7½	+½	—
Globe Tel. & Tel. Ord.	10	3½*	4½*	14½	+½	3 2 2
Do. do. Pref.	10	6	6	14½	—	4 4 3
Great Northern Tel.	10	20	20	45½	+1	4 19 0
Marconi-Marine	1	10	7½	30/–	–⅛	5 0 0
Oriental Telephone Ord.	1	12*	12*	3½	—	3 13 10

HOME AND FOREIGN TRAMS, ETC.

Anglo-Arg. Trams First Pref.	5	Nil	Nil	1/–	—	—
Do. do. 2nd Pref.	5	Nil	Nil	9d.	—	—
Do. do. 5% Deb.	Stock	Nil	Nil	5	—	—
British Electric Traction Df. Ord.	,,	5	5	1475	+25	—
Do. do. Pref. Ord.	,,	8	8	177½	—	4 16 2
Brazil Traction	100	—	30 cts.	13½	+½	—
Brit. Columbia Elec. Rly. Pce.	Stock	5	5	102½	—	4 17 7
Mexican Light Common	100	Nil	Nil	3½	—	—
Do. 1st Bonds	$500	5	5	53	+3	—
Victoria Falls Ord.	1	20	20	76/3	—	—
West Riding	1	5	6½	51/3	—	2 10 9

MANUFACTURING COMPANIES.

Aron Electricity Ord.	1	10	15	61/3	—	4 18 0
Assoc. Elec. Ord.	1	6	8	48/6	+6d.	3 6 0
Do. Pref.	1	8	8	38/9	+6d.	4 2 1
Babcock & Wilcox	1	8	8	48/9	—	3 5 8
British Aluminium Ord.	1	7½	7½	2	+1/6	3 15 0
British Insulated Ord.	1	15	20	⅜	+½	3 14 5
Brush Ord.	Stock	Nil	Nil	37½	–5	—
Callender's	1	15	15	4½	+⅛	3 10 8
Do. 6½% Pref.	1	6½	6½	32/6xd.	—	4 0 0
Crompton Parkinson Ord.	5/–	—	12½	4½	+½	0 10 0
Do. 8% Pref.	1	8	8	38/9	–⅛	4 2 6
Edison Swan 1st Pref.	1	7½	7½	30/–	—	5 0 0
Electric Construction	1	3½	7	1⅛	+⅛	3 17 3
Enfield Cable Ord.	1	25	25	5½	—	4 15 3
English Electric	1	Nil	Nil	23/–	+2/–	—
Do. do. Pref.	1	Nil	Nil	27/–	+1/9	—
Ericsson Tel.	5/–	24	20*	2⅛	+⅛	2 3 4
Ever Ready	5/–	35	35	26/9	+6d.	6 10 10
Ferranti Pref.	1	7	7	27/6	—	5 1 10
G.E.C. Pref.	1	6½	6½	33/–	—	3 18 9
Do. Ord.	1	10	15	79/–	—	3 16 0
Henleys	1	30	30	7½	—	4 1 4
Do. 4½% Pref.	5	4½	4½	5½	—	3 18 3
India-Rubber Preferred	1	—	5½	1½	—	4 17 9
Johnson & Phillips	1	7½	10	46/3	—	4 6 6
Lancashire Dynamo	1	5	10	2⅛	—	4 6 6
Siemens Ord.	1	4	6	28/9	—	4 3 6
Telegraph Construction	£1	Nil	Nil	26/3	—	—

* Dividends are paid free of Income Tax.

Published Specifications

Compiled expressly for this journal by a firm of chartered patent agents. The numbers in parentheses are those under which the specifications will be printed and abridged and all subsequent proceedings will be taken

1933

30845. "Electrolytic production of lead." National Processes, Ltd., A. R. Gibson, and S. Robson. November 5th, 1934. (448328.)

1934

25181. "Synchronising means for television and like systems." E. C. Cork, C. O. Browne and M. Bowman-Manifold. August 31st, 1934. (Cognate applications, 29874/34 and 7205/35.) (448031.)

27775 "Thermionic valves." S. Rodda. September 27th, 1934. (448101.)

31511. "Dynamo-electric machines." British Thomson-Houston Co., Ltd. November 2nd, 1933. (448253.)

34202. "Electric wiring systems." G. R. Shepherd (Westinghouse Electric & Manufacturing Co.). November 28th, 1934. (448037.)

34205. "Television or electrical time-base systems." A. C. Cossor, Ltd., and L. H. Bedford. November 28th, 1934. (448111.)

34336. "Vapour electric discharge devices." British Thomson-Houston Co., Ltd., and W. J. Scott. November 29th, 1934. (Cognate application, 34568/34.) (448041.)

34364. "Carrier-wave signalling system." Marconi's Wireless Telegraph Co., Ltd. November 29th, 1933. (448043.)

34408. "Thermionic amplifiers." Kolster-Brandes, Ltd., and C. W. Earp. November 30th, 1934. (448113.)

34486. "Overhead electrical conductors." London Electric Wire Co. & Smiths, Ltd., and M. J. Crowley. November 30th, 1934. (448187.)

34487. "Electric heating devices such as electric cookers." General Electric Co., Ltd., and O. W. Humphreys. November 30th, 1934. (448121.)

34655. "Scanning devices for television apparatus." E. Traub. December 3rd, 1934. (448238.)

34661. "Recorders for echo sounding and other recording apparatus in which marking is effected by electro-chemical means." H. E. Morse and E. B. D. MacKenzie. December 3rd, 1934. (448331.)

34666. "Methods and apparatus for suppressing noise in automobile radio receivers." Coutts & Co. and F. Johnson (legal representatives of J. Y. Johnson (deceased).) (Philadelphia Storage Battery Co.) December 3rd, 1934. (448045.)

34687. "Magnetic materials." Naamlooze Vennootschap Philips' Gloelampenfabrieken. December 4th, 1933. (448046.)

34712. "Electric circuit-breakers." International General Electric Co., Inc. December 1st, 1933. (Addition to 405000.) (448255.)

34767. "Coin-freed prepayment mechanism for electricity meters." G. Wilson Gasmeters, Ltd., J. H. Wilson and S. Johnson. December 4th, 1934. (Cognate application 22761/35.) (448257.)

34907. "Tramway rail crossings." W. V. Morland. December 5th, 1934. (448336.)

34935. "Tuning indicators for radio receiving apparatus." G. B. Kemp, L. A. Armstrong and J. W. Courtman. December 5th, 1934. (448268.)

34960. "Systems of electric motor control." British Thomson-Houston Co., Ltd., and K. M. Fox. December 5th, 1934. (448339.)

34961. "Electric discharge lamps." British Thomson-Houston Co., Ltd., L. J. Davies and W. J. Scott. December 5th, 1934. (448340.)

34962. "Frequency-changing arrangements for supplying high-speed rotary field motors." Siemens-Schuckertwerke Akt.-Ges. December 5th, 1933. (Cognate application 34963/34.) (448341.)

35210. "Method of fixing the pin in high-tension electric insulators, particularly in suspension and terminal strain insulators." E. Seifried. December 7th, 1934. (448137.)

36003. "Moving-coil loudspeakers." E. K. Cole, Ltd., and A. E. Falkus. December 15th, 1934. (448189.)

36757. "Telephone systems." Clifford & Snell (Eng.), Ltd., and F. S. Clifford. December 21st, 1934. (448191.)

1935

56. "Electrical musical instruments." J. Compton Organ Co., Ltd., and L. E. A. Bourn. January 1st, 1935. (448193.)

2115. "Electric discharge lamps." Siemens Electric Lamps & Supplies, Ltd., and J. N. Aldington. January 22nd, 1935. (448280.)

3351. "Means for adjusting selectivity in wireless receivers." Ideal Werke Akt.-Ges für Drahtlose Telephonie. February 15th, 1934. (448058.)

9284. "Distribution pillars, sub-station panels and like arrangements." British Insulated Cables, Ltd., and R. W. Blades. March 25th, 1935. (448141.)

9721. "Electrically controlled locks." W. G. H. Brooker and A. G. Clough. March 28th, 1935. (448292.)

10830. "Anode sleeves or housings of metal-clad electric arc convertors provided with insulated grids or baffles." General Electric Co., Ltd., and E. Gallizia. April 8th, 1935. (448142.)

11087. "Telephone instruments." General Electric Co., Ltd., A. Warrington and A. F. Jones. April 10th, 1935. (448143.)

14423. "Electric arc convertors." Allgemeine Elektricitäts-Ges. May 17th, 1934. (448296.)

14535. "Cathode-ray tubes for use in television and the like." General Electric Co., Ltd., and L. C. Jesty. May 17th, 1935. (448146.)

15172. "Radio-receiving systems." Marconi's Wireless Telegraph Co., Ltd. May 28th, 1934. (448147.)

15685. "Television systems." Marconi's Wireless Telegraph Co., Ltd. May 29th, 1934. (448065.)

16213. "Regulating arrangements for a.c. stage and similar lighting installations." Siemens Schuckertwerke Akt.-Ges. April 26th, 1935. (448302.)

16480. "Electric heating resistances, and process of manufacturing same." Soc. Anon. Manufacture Générale Metallurgique. June 9th, 1934. (448360.)

18348. "Synchronising means for television and like purposes." E. C. Cork and M. Bowman-Manifold. August 31st, 1934. (Divided out of 448031.) (448066.)

19167. "Electrical condensers." Plessey Co., Ltd. July 23rd, 1934. (448151.)

20150. "Insulating materials, and electrical materials insulated therewith." British Celanese, Ltd. July 26th, 1934. (448307.)

22958. "Electrolytic condensers and other electrolytic devices." Dubilier Condenser Co. (1925), Ltd. August 22nd, 1934. (448163.)

24689. "Magnetron tube circuit arrangements." Telefunken Ges. für Drahtlose Telegraphie. September 4th, 1934. (448072.)

24706. "Electric discharge rectifiers." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. September 5th, 1934. (448210.)

24775. "Transformers for feeding luminous tubes." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. October 3rd, 1934. (Cognate applications, 24776/35 and 24777/35.) (448312.)

24951. "Centrifugally operated electric switches." British Thomson-Houston Co., Ltd. September 7th, 1934. (448371.)

27873. "Thermal time delay switch mechanism." British Thomson-Houston Co., Ltd. October 11th, 1934. (448077.)

28326. "Barometric valve for mercury-vapour rectifiers." Siemens Schuckertwerke Akt.-Ges. October 12th, 1934. (448379.)

28898. "Electric clocks, time-switches and the like." Landis & Gyr Akt.-Ges. November 24th, 1934. (448080.)

29376. "Junction boxes for electric cables." Siemens Schuckertwerke Akt.-Ges. August 26th, 1935. (448317.)

30224. "Carrier-wave signalling systems." Standard Telephones & Cables, Ltd. December 14th, 1934. (Addition to 427605.) (448084.)

30254. "Electric water heaters." W. F. Tipping. November 1st, 1935. (448319.)

30586. "Dynamo-electric generators." Standard Telephones & Cables, Ltd. November 6th, 1934. (448320.)

30931. "Suspending device for electric lighting fittings, and the like." C. A. R. Knotschke. November 16th, 1934. (448222.)

31968. "Arrangement for wavelength and other switching in radio receivers." E. K. Cole, Ltd. December 8th, 1934. (448088.)

32181. "Electric welding apparatus." British Thomson-Houston Co., Ltd. November 20th, 1934. (448391.)

32466. "Image suppressing circuits for superheterodyne radio receivers." Standard Telephones & Cables, Ltd. April 4th, 1935. (448321.)

35241. "Combined electrode holder and nozzle for a gas-arc torch." British Thomson-Houston Co., Ltd. December 28th, 1934. (448231.)

1936

1801. "Small multi-pole automatic circuit-breakers." W. Leyhausen. February 6th, 1935. (448397.)

4240. "Roofs or covers of electric smelting furnaces." Sulzer Frères Soc., Anon. February 16th, 1935. (448403.)

8299. "Television and like systems." C. O. Browne, E. C. Cork and M. Bowman-Manifold. October 18th, 1934. (Divided out of 448031.) (448097.)

Trade Mark Applications

The following are among the recent applications for British trade marks. Objections against any of the proposed marks may be entered within one month from June 24th :—

Ozagram. No. 568119. All goods in Class 8.—British Ozaphane, Ltd., 72a, Carlton Hill, St. John's Wood, N.W.8.

Rexicon. No. 568678. Class 8. Radio and television transmitting and receiving sets and parts thereof, &c.—Rexicon, Ltd., 22, High Road, Hampton Wick, Middlesex.

Anglates. No. 567088. All goods in Class 13.—Benjamin Electric, Ltd., Brantwood Works, Tariff Road, Tottenham, N.17.

Exceloid. No. 565135. Class 50. Plasting moulding compositions of cellulose and celluloid and articles made of celluloid and cellulose derivatives, synthetic resin or casein or similar material.—Exceloid Co., Ltd., Greenup Row, Lichfield, Staffs.

Extinguishing Electrical Fires

Particular attention was paid to electrical hazards in a paper on "Lux" carbon dioxide fire fighting appliances presented by Mr. G. Lambert, of the Walter Kidde Co., Ltd., in association with John Kerr & Co. (Manchester), Ltd., at the recent annual conference in Edinburgh of the Professional Fire Brigades' Association. The paper points out that with enclosed alternate cooling systems the fire risk is not great, but air may leak into the machine and ducts. By injecting CO_2 gas flame is extinguished and prevented from spreading. Switch and transformer rooms are usually arranged to be flooded with gas; the discharge can be manual or automatic. In general, an arc cannot be extinguished by CO_2, nevertheless fires in cable trenches can be localised by gas flooding. For this purpose trenches may be divided by means of fireproof partitions. "Lux" flooding systems have also been applied to small automatic sub-stations and to pulverised fuel hoppers.

New Work for Contractors

Particulars of new works and building schemes for the use of electrical installation contractors and traders

Publication in this list is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Aberdare.—Cinema, for the Union Cinema Co., Ltd.

Altrincham.—Houses (140), Park Road, Timperley; Borough Estates, Ltd., Riddings Road, Timperley.

Banstead (SURREY).—Houses (55), Walton-on-the-Hill; U.D.C. surveyor.

Barking.—Flats (£23,130); borough engineer.

Batley.—Senior school, Carlinghow; director of education.

Bedfordshire.—Senior school, Ampthill, and senior school, Shefford (£20,000); director of education, Bedford.

Bilston.—Houses (276), Millfields estate (£75,290), with electrical work; Kendrick & Sons, Ltd., builders, Walsall. Council school, Ettingshall (£23,692), and additions to Stonefield Senior school (£21,237), for E.C.

Birkenhead.—Technical college; Harold A. Dod, architect, Liverpool.

Birmingham.—Block of administrative offices, facing Easy Row, for Corporation (£292,550), with electrical work; T. Cecil Howitt, architect, Nottingham.

Bridgwater.—Houses (468); town clerk, Council Offices.

Bursiem.—Houses (26), Milton Road; Shenton Bros. Houses (37), near Station Road, Milton; A. Owen.

Cambridge.—Extensions to Newnham College (£100,000); Miss Elizabeth Scott & Partners, architects.

Chelmsford.—Houses (46) and bungalows, Rainsford Lane; borough engineer.

Chesham (BUCKINGHAMSHIRE).—Cinema, flats and shops, Germain Street, for Shipman & King, Charing Cross Mansions, London, W.C.2.

Coventry.—Houses (160), Barras Heath estate (£56,424); city engineer.

Darlington.—School, Carmel Road; director of education.

East Sussex.—Schools, Heathfield (500 places) and Golden Cross, Chiddingly; director of education, Lewes.

Edinburgh.—Extensions to Leith Tramway depôt (£30,000); city architect.

Epsom.—Shops and flats, Ewell; Harold Samuel Properties, Ltd. Houses (32), Hook Road; S. Darton, builder, Ewell.

Essex.—Senior schools (560 places), Broomfield; John Sargent, director of education, Chelmsford.

Folkestone.—Schools, Harcourt Road, for Borough E.C.; E. Walmsley Lewis, architect, Kia Ora, Radipole, Weymouth.

Gainsborough.—Houses (46); U.D.C. surveyor.

Glasgow.—Cinema, Cumbernauld Street; John M'Kissack & Son, architects. School, Killearn Street, for Corporation E.C.; architect, Education Offices, Bath Street.

Golborne.—Houses (30) near Moor Road, Orrell Road and Latham Lane; G. Ashurst, Orrell Road.

Gravesend.—Senior school, Wrotham Road, for King Street Old National School Foundation; L. C. Troughton, secretary.

Greenford.—Factory, for the Bontex Knitting Works, Ltd., London, N.

Grimsby.—Cinema, for the Associated British Cinemas, Ltd. Hospital (£139,000) and extensions to Town Hall (£38,000); borough engineer.

Guisborough (YORKSHIRE).—Houses (36); U.D.C. surveyor.

Hatfield (HERTFORDSHIRE).—Factory, Welham Green, for Imperial Chemical Industries, Ltd., Nobel House, Buckingham Gate, London, S.W.1.

Haydock (LANCASHIRE).—Houses (186); Harry Horridge, builder, Earlestown.

Hebburn-on-Tyne.—Senior school; T. A. Page & Son, architects, 67, King Street, South Shields.

Hendon.—Houses (28), Ashley Lane; R. G. Cox, architect, 60a, High Street, London, W.3. Houses (52), Rushgrove Avenue; S. A. S. Yeo, architect, Station Chambers, Turnmill Street, London, E.C.1.

Hertfordshire.—Senior schools, Croxley Green; director of education, Hertford.

Hull.—Mental defectives' colony, Winstead (£38,790); A. E. Jones (Hull), Ltd., builders. High school (£74,745), for City E.C.; city architect. Houses (176), Elm Tree Farm and High Farm estate, Marfleet, and junior school, Taylor Avenue; city architect.

Ilford.—Houses (34), near Bryan Road; J. S. Broadbent, chartered architect, Phœnix Offices, Rainham. Houses (36), Christie Gardens; P. Triplete, Ltd., 1, Palma Gardens, Barley Lane, Goodmayes. Houses (22), Larlands Road; A. C. S. Wheeler, architect and surveyor, 59, Windsor Road, E.7. Houses (208), Tomswood Hill; Davis Estates, Ltd.

Irish Free State.—(DUBLIN).—Single-storey block of offices, Custom House quay, for the Dublin Port and Docks Board, 19, Westmoreland Street, Dublin; Board's engineer, East Wall, Dublin, C.10. (MONAGHAN, CO. MONAGHAN).—Bacon factory for the Monaghan Curing Co., Ltd.; McAteer & MacEntee, consulting engineers, 9, Dawson Street, Dublin.

Kidderminster.—Houses (65), near Hoo Road, for T. P. Smith, Ltd. Houses (34), Grosvenor Avenue estate, for J. C. Richards.

Kingsbury.—Factory, for the Armstrong Cork Co., Aldwych, London, W.C.2.

Kingston-on-Thames.—Houses (26) and flats, Dickerage Lane site; borough surveyor.

Kirkcaldy.—Cinema (£20,000) for the Cinema Holdings (Kirkcaldy), Ltd.; R. M'Lauchlin, North St. Andrew's Street, Edinburgh.

Leeds.—Houses (280); S. Smith, builder, Oxford Road, Gomersall. Houses and flats, Fairfax Road estate, Beeston; housing director. Houses, Randolph Street and Atlanta Street, Bramley; Scott Bros. Buildings, Westgate, Lisbon Street and Skinner Street; Dunlop Rubber Co., Ltd. Schools, Halton Moor and Carr Manor estates; city architect.

Leicester.—Bus station, Burleys Lane (£55,000); city engineer. Health centre, Belgrave Gate (£122,000); Stockdale Harrison & Sons, architects. Senior school, Tailby estate £28,806), and rebuilding Newarke girls' school, Imperial Avenue (£63,663), for E.C.

Liverpool.—Houses and flats, Sparrow Hall estate; director of housing. Rebuilding factory (£250,000); British Ropes, Ltd. Flats (194), St. Domingo Road; director of housing.

London.—(BERMONDSEY).—Factory, Boss Street; G. Payne & Co. Factory, Keetons Road; Wallis Gilbert & Partners, 15, Elizabeth Street, S.W.1. (CAMBERWELL).—Tenements, Garden Street (£50,000); L.C.C. architect. (FINCHLEY).—Factory and offices, for Kiwi Polish, Ltd., Church End, N.3. (HAMMERSMITH).—Extensions to hospital (£22,817); L. H. & R. Roberts, 144, Lower Clapton Road, E.5. (HOLBORN).—Restaurant, 3-9, Southampton Row; J. Lyons & Co., Ltd. (LAMBETH).—Tenements (144), Lilford Street (£78,000); L.C.C. architect. (LEYTON).—Houses (£30,000); borough surveyor. (POPLAR).—Tenements (57), Coventry Cross estate (£36,600); L.C.C. architect. Town Hall, Bow Road (£163,000); Gee, Walker & Slater, Ltd., Berkeley Square, W.1. (PARK ROYAL).—Factory, for Magnus Cohen & Co., 6, Park Royal Road, N.W.10. (SHOREDITCH).—Tenements (102), Haggerston Road (£38,684); Henry Boot & Sons, Ltd., 10, The Boltons, S.W.10.

Maidstone.—Houses (188) and extensions to town hall; borough surveyor.

Manchester.—Enlargement to Transport depot (£82,000); city engineer. Extensions to College of Technology (£295,000); city architect.

Middlesbrough.—Houses (200), £69,000, and police station, courts and fire station (£150,000); borough engineer.

Newcastle-on-Tyne.—Houses (333), in connection with three clearance schemes, and alterations and additions to the Shotley Bridge Mental Colony for C.C. (£42,000); city architect. Church, Benwell Grove; J. Jackson & Sons, builders, Corporation Street.

Nottingham.—Infants' and junior schools, Bilborough estate, and block at Whitemoor school; city engineer and surveyor.

Nottinghamshire.—Junior and infants' school, Mapperley (£21,063), for County E.C.

Orpington.—Houses (44) and bungalows, Lodge Crescent and Bark Hart Road; R. L. Johnson.

Petts Wood.—Houses (91) and bungalows, Southborough Park estate; New Ideal Homesteads.

Plymouth.—Houses (34), Davis estate, St. Budeaux; Davis Estates, Ltd. Bus station, Tavistock Road, and school, King's Tamerton; city architect.

Princes Risborough.—Cinema, Bell Street, electrical work; Charles H. Wright, architect, 24, Temple Street, Aylesbury.

Ramsey (ISLE OF MAN).—Houses (38), Upper Queen's Pier Road; surveyor to the Commissioners.

Rowley Regis.—Municipal buildings (£41,000), electrical work; Stanley A. Griffiths, architect, High Street, Stourbridge.

St. Albans.—Houses (100); city surveyor.

St. Helens (LANCASHIRE).—Houses (210), Fern estate, near Gartons Lane, for T. Ashcroft.

Sheffield.—Houses (43), Crowland Road; Oxspring Bros.

Shipston-on-Stour.—Houses (70); R.D.C. surveyor.

Spalding.—Cinema, Westlode Street, electrical work, for Spalding Picture House, Ltd.

Stoke-on-Trent.—Houses (28), near Belgrave Road; A. Lilley. Houses (42), Hunters Croft; J. Thomson. Cinema, Uttoxeter Road; Broadway Cinema Co. Junior School, Cornhill housing estate, for E.C.

Stone (STAFFORDSHIRE).—Factory and model village, Barlaston, for J. Wedgwood & Sons, Ltd., Etruria, Hanley.

Swadlincote.—Houses (48), Darklands Road site; U.D.C. surveyor.

Swansea.—Cinema, Briton Ferry, for the Palace Kinema Co., Ltd.; Mercer & Vaughan, architects, Wind Street, Swansea.

Swindon.—Municipal buildings (£59,200); Spackman & Sons, builders.

Tenterden (KENT).—Cinema; Shipman & King, Charing Cross Road, London, W.C.2.

Tipton.—Houses (53), Dudley Port; William Whittingham, builder, Wolverhampton.

Uttoxeter.—Houses (46); A. & M. Griffiths, builders, Wolverhampton.

Walthamstow.—Two factories, for the Lea Bridge Factory Estate Co.

Warminster (WILTSHIRE).—Houses (24), The Ham, Heywood, for Messrs. Haddock, Trowbridge.

Warrington.—Houses (250), Bruche Park estate; J. R. Ashall, builders, Manchester Road. Houses (40), Oaks estate; A. Mather, builder, Padgate. Houses (300), Sankey Lodge estate, Liverpool Road, Great Sankey; R. & H. Fletcher, Ltd., builders. Lyddesdale Avenue, Cleveleys, Blackpool. Factory, Norman Street, for the Alliance Box Co., Ltd.

Washington (DURHAM).—Houses (229); U.D.C. surveyor.

Welwyn Garden City.—General hospital (£25,000); U.D.C. surveyor.

West Bromwich.—Cinema, Hall Green Road; H. A. Sheldon. Factory and offices, Black Lane; Ash & Lacy, Ltd.

Whitley Bay.—Alterations to premises for Cann, Ltd.; J. W. Taylor, architect, St. John Street, Newcastle-on-Tyne.

Widnes.—Houses (57), Ansdell Road, Lytham Road, and Fairhaven Road; R. & H. Fletcher, Ltd., Lyddesdale Avenue, Cleveleys, Blackpool.

Winchester.—Houses (20); W. R. Cowell, R.D.C. surveyor, Ryelands, Hedge End, Southampton.

Wing (LEIGHTON BUZZARD).—Houses (110), for A. S. Heley.

Worthing.—Amusement hall on Municipal Pier; borough engineer and surveyor. Houses (24), Angmering; R.D.C. surveyor.